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PICKS and SHOVELS

By O. E. POTTER

A Mother-in-Law's Funeral Cost Contractor Plenty

A funeral not in the contractor's family but of a person totally unrelated cost a mid-west contractor a pretty penny some time ago. He had finished a considerable length of fill to the satisfaction of the resident state engineer in charge of the work and the latter was to check the slopes the middle of the week for the final estimate for that section. Unhappily for the contractor, the engineer's mother-in-law died and the engineer attended the funeral at a distant point, being absent from the work until the beginning of the next week.

Over the week-end, the sky let forth a flood of waters that washed out slopes and grade in many places. The engineer could not accept the work in that condition, although he knew it was entirely satisfactory when he left the work the middle of the previous week.

The contractor was forced to put on a couple of wheeled scrapers and a rotary fresno or two for several days to fill the gullies in the slopes of fills before the work was equal to the condition it was in before the funeral.

Thus another contractor was forced to pocket a loss through no fault of his own but neither, may we add, through the fault of the engineer.

River Contractors Have Own Safety Race

A contest for which there is no prize but the satisfaction of accomplishment is being conducted by the group of hardy contractors who are building the locks and dams up and down the Mississippi this year. A minimum number of lost hours through accidents is the goal, and the beneficiaries as well as the participants are the workmen on these gigantic jobs.

Our Editor ran smack into this contest on Dam 16 at Muscatine, Iowa,

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C. & E. M. Photo

A Man-Made Dust Storm. Blowing Fines and Dust from Surface Before Priming with Tar

New 130-Hour Limit For Highway Labor

Monthly, Not Weekly, Hours Used to Limit Employment Under 1935 Emergency Act

UNDER the regulation covering the hours of employment of labor for highways and grade crossings under the Emergency Relief Act of 1935, an individual may work 8 hours a day until 130 hours within one month has been reached. This is a decided advantage over the regulation under the last previous Federal Appropriation, where employment was confined to 30 hours within any one week. The wage scales are to be determined by the state highway departments for all classes of labor and the 130-hour per month limit applies to manual labor while the maximum hours of work for clerical and other non-manual employees is 8 hours per day and 40 hours per week. Persons employed on projects so remote and inaccessible that camps or floating plants are necessary may work 8 hours per day and 40 hours per week.

The following general regulations of employment have been set up by the President in the Rules and Regulations covering allotments under the Emergency Relief Act.

(a) No person under the age of sixteen years and none whose age or physical condition is such as to make his employment dangerous to his health or safety, or to the health or safety of others, may be employed on any work project. This paragraph is not to be construed to operate against the employment of physically handicapped persons, otherwise employable, where such persons may be safely assigned to work which they can ably perform.

(b) No person currently serving sentence to a penal or correctional institution shall be employed on any work project.

(c) Preference in the employment of workers shall be given to persons from the public relief rolls, and except with the specific authorization of the Works Progress Administration, at least 90 per cent of all persons working on a work project shall have been taken from the public relief rolls.

(d) Only one member of a family group may be employed on the works program, except as specifically author-

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Inverted Penetration on New Top-Soil Base for 23-Mile S. C. Job

(Photo on page 44)

McDougald of Atlanta Used Mechanical Blower Ahead of Tar Prime, Asphalt Coat and Seal

SPEED of handling every operation from clearing and grubbing the 50 per cent new location on its contract running southeast from Chester, S. C., a distance of nearly 23 miles, right through grading, rough and fine, priming, placing the stone and applying the asphalt marked the work of the McDougald Construction Co. This same contractor completed another similar section about 30 miles north of Chester just before tackling the one described in this article. Work was started on clearing and grubbing October 5, 1933, the first prime was applied to the new 12-inch top-soil base on August 14, 1934, and the job was complete early in November, 1934. How did they do it? Well, here's the story.

Heavy Grading and Excavation

With 50 per cent of the right-of-way in new location and 240,000 yards of excavation there was plenty of rough work at the start. A Lorain 75A 1¼-yard shovel, a Lima 101 1¼-yard shovel and a P & H 1-yard shovel were started about the same time at different parts of the job to get out the earth, with six trucks hauling from under each shovel. The free haul on the job was 1,000 feet but the maximum haul required for balancing cuts and fills was around 2,000 feet. The average haul, however, fell well within the free haul distance.

From a point about 3 miles from the northwest, or Chester, end of the contract there was a 300-foot cut, running about 25 feet deep out of which the shovel removed 15,000 yards of earth. Four miles northwest of Great Falls, S. C., which was the southeast end of the job, 17,000 yards was taken out of a cut 600 feet long and 30 feet deep. Both these cuts included some rock excavation, the first being shot with black powder and the other, being a granite, was drilled and shot with dynamite. Two I-R jack hammers with a Chicago-Pneumatic air compressor drilled holes running up to a maximum depth of 8 feet, which were loaded with 60 per cent du Pont dynamite and shot with a battery.

W. H. Castle of Chester, S. C., was the subcontractor on hauling and F. A. Triplett, also of Chester, S. C., was the subcontractor on all concrete culverts.

"Blue Topping"

Every trade has its pet expressions which are distinctly outside the technical terminology understood everywhere. There are several states we have visited where the use of the expression "blue topping" has become common with engineers and contractors. It refers to preparing any grade to a set of stakes which are specially marked with blue crayon on the tops. In this case they were used to identify the stakes for the grade to which the 22-foot subgrade was cut before the new top-soil base was spread.

On one half of the job a group of wheelers with 2-up mule teams and 3-up snatch or hook teams were used to clear out the shallow cuts. Then for another 5 miles a Caterpillar elevating grader pulled by a Caterpillar Sixty tractor was

(Continued on page 12)

BUILDING LEVEE IN LOUISIANA

C. & L. M. Photo

The Walking Dragline Owned by Harris, Brandenburg & Greeson working in a Riverside Borrow Pit. **See Page 10**

Ten Imhoff Tanks Added to Sewage Works at Rochester, N. Y.

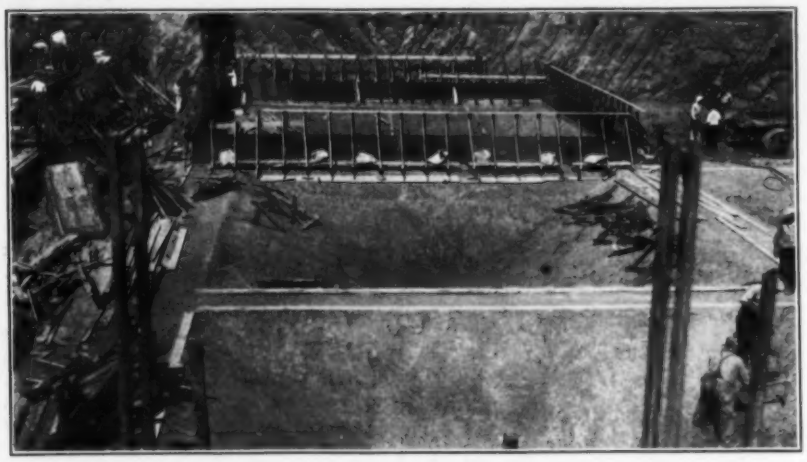
(Photos on page 44)

Building Scaffolds, Overhead Runways and Other Unusual Methods Used by Pike & Son

THE contractor who built the ten new Imhoff tanks adjacent to the original 1915-18 Irondequoit sewage treatment plant installation at Rochester, N. Y., thereby doubling the capacity of these works, applied the tools and methods he had used successfully on building construction to a type of work which was new to him. The features of the work of John B. Pike & Son, Inc., of Rochester, N. Y., were the complete concreting plant, overhead runways, methods of vibrating the concrete, use of building scaffold jacks for outside runways, and the handling of the forms.

Excavation

The Newport Construction Co. of Rochester, subcontractor for the excavation, used two Osgood Conqueror shovels to cut the 30-foot bank and then used hand excavation for the hopper bottoms of the Imhoff tanks. In order to facilitate drainage and permit rapid work in the hopper excavation, 8-inch Armco perforated pipe was laid for drainage beneath the apex of the hoppers. The hopper bottoms, 2 feet thick, were poured directly on the ground.



Erection of Forms for a Hopper and First Lift of the Wall

Plywood Forms

"I am betting on using the plywood forms ten times," said the Superintendent, and he made good on that statement. The footing forms were also used over ten times, being oiled before usage and cleaned after each stripping. The forms were all lined with ¾-inch 5-ply wood and had 3 x 4-inch studs 24 inches on center with double 2 x 6 wales on 4-foot centers. The forms were uniformly 4 feet high, as that was the standard lift for pouring concrete throughout the job.

Aggregate and Cement Handling

The handling of sand and gravel as well as the cement was subcontracted to the Newport Construction Co. of Rochester for the aggregate and to another subcontractor for the cement. All aggregate was trucked in, dumped and then rehandled by an Osgood crane with a 40-foot boom and a 1-yard Lakewood clamshell to the bins. Payment by the contractor for aggregate was on a basis of delivery to the contractor's bins.

The cement contractor handled two carloads of Lehigh, Edison or Iron Clad cement per day, using four men. The bags of cement were unloaded from the trucks to a Mathews roller conveyor. Excess cement was stored in a galvanized iron cement shed which was open on the east side and with windows on the west side. When the contractor was looking around for an economical way to handle the cement on this job, he gave consideration to the use of a roller conveyor but shied away from it when he was told most emphatically by several engineers that cement sacks would not move readily on a roller conveyor. Later on, looking into the proposition more carefully, he quickly diagnosed the troubles of others and placed a piece of plywood under each pile of three bags of cement which let it roll to the mixer continuously.

Concrete Mixing Plant

The dual concrete mixing plant was located at the center of the east side of the rectangular plot in which the ten Imhoff tanks were built. By careful planning the contractor developed an efficient plant, one-half of which could produce sufficient concrete for the 4-foot lift section of walls, and the two plants together could produce sufficient mass concrete to permit rapid progress.

One of the two plants was equipped with an Erie bin and the other with a Johnson bin. Each of them had a pair of Johnson weighing batchers which delivered to two 1-yard Ransome mixers, driven by Hercules motors. The labor organization for each concreting plant was two men on cement, one batch man and one man on water and a hoist man to handle the 35-horsepower Clyde hoist driven by a Waukesha motor.

Two Dravo-Doyle American tubular towers 65 feet high and each carrying a 1¼-yard Dravo concrete bucket were erected immediately in front of the mixers. The average batch consisted of 1,860 pounds of stone, 1,320 pounds of sand and 6 bags of cement. When pouring the hopper bottoms where a no-slump concrete was desired, 14 gallons of water was used per batch while on the walls, where a 2-inch slump concrete was used, 24 gallons of water was used in mixing each batch.

The average production with one mixer, and using eight one-man concrete buggies to haul away the concrete, was 38 cubic yards per hour. Even with production stepped up to 50 yards per hour, it was possible for one man to care for feeding all of the cement to the mixer. The construction schedule was maintained at 5,000 cubic yards of concrete per month.

Runways

Three types of runways were used: those laid on top of the forms, using long I-beams for stringers; runways carried outside the forms on building scaffold jacks; and overhead runways.

C. & E. M. Photo

C. W. Blazer, General Manager for the Contractor (Right) and K. J. Knapp, Resident Engineer for the City

The runways which were carried immediately over the forms were built up in panels 4 x 10 feet of ⅞-inch lumber and with ⅞-inch stiffeners, one at each side and one in the center. They were carried on 8-inch I-beams with an average span of 38 feet, using 4 x 4's for floor beams.

The use of building scaffold jacks to support the runways which were set up along the edge of the tanks for pouring the first 14 feet of wall gave an unusual appearance to the job. Usually a contractor would erect a standard scaffold of 4 x 4's for this purpose but this contractor, having a background of building experience and plenty of the building scaffold jacks on hand, used them to good advantage. The jacks had a 4-foot base and were 15 feet high. By carrying the runways to a height of 14 feet on these jacks, it was possible to pour the wall from the hopper bottoms up to the level of the mixing plant.

The overhead runways were used to pour the upper 17 feet of the tank walls above the 14-foot sections already mentioned. The overhead runways had an upper and a lower level. Concrete was run out in buggies on the high level and chuted to the lower level to a second buggy for hauling to the forms. These overhead runways were built down the center line of the long dimension of the tanks with a spur at the middle leading to the 20 x 40-foot loading platform in front of the mixer towers. This spur runway was 8 feet wide and 65 feet long while the longitudinal runway was 460 feet long. The runways carried a double track made of 4-inch channels with the legs up and flared at the ends. This prevented loaded buggies from falling off the runways if the laborers got too interested in "sight-see-

(Continued on page 19)

California Methods of Maintaining Low Cost Roads

By T. H. DENNIS

Maintenance Engineer, Division of Highways, State Dept. of Public Works of California

LOW-TYPE bituminous-treated surfaces in California range from thin dust oil carpets over natural subsoils to light retreads and plant or road mixes over improved sub-bases.

Dust Oil Carpets

The dust oil carpets are constructed by penetrating or mixing the natural soils with varying amounts of slow curing road oils, usually SC-2 or 3, the initial thickness of ½-inch being gradually increased with each successive oiling.

This type quite generally prevails in the recreational areas or on roads carrying less than 500 vehicles daily. In the initial stages, it intensifies rather than reduces maintenance, due to the difficulty of maintaining a light surface over subsoils of varying characteristics and compaction. Even at this stage, however, it offers a real service to the motorist, as it not only eliminates the dust nuisance and attendant hazard, but materially lessens his cost of car operation. Repeated oilings gradually result in a thickened cake of uniform consistency, capable of carrying traffic under less insistent maintenance.

Maintenance is usually governed by the success of the original treatment. Where a subsoil of varying compactness has been penetrated rather than mixed, the numerous pot holes which develop early are lightly disced or bladed and recompacted under traffic. Where the pot holes are less extensive, the failures are filled with a pre-mix of the roadside material treated with the same grade of oil as was used in the surface. This pre-mix can be made at moderate cost by applying the oil to selected roadside locations and mixing the treated material with a tractor grader. Where ravelling rather than pot holes is encountered, the oil may be hand sprayed and covered with the roadside material.

The surprisingly excellent results obtained with this light surface justifies its inclusion in the low-type class; and it has a very real place on the many miles of secondary roads which have been graded but not constructed to any accepted standard.

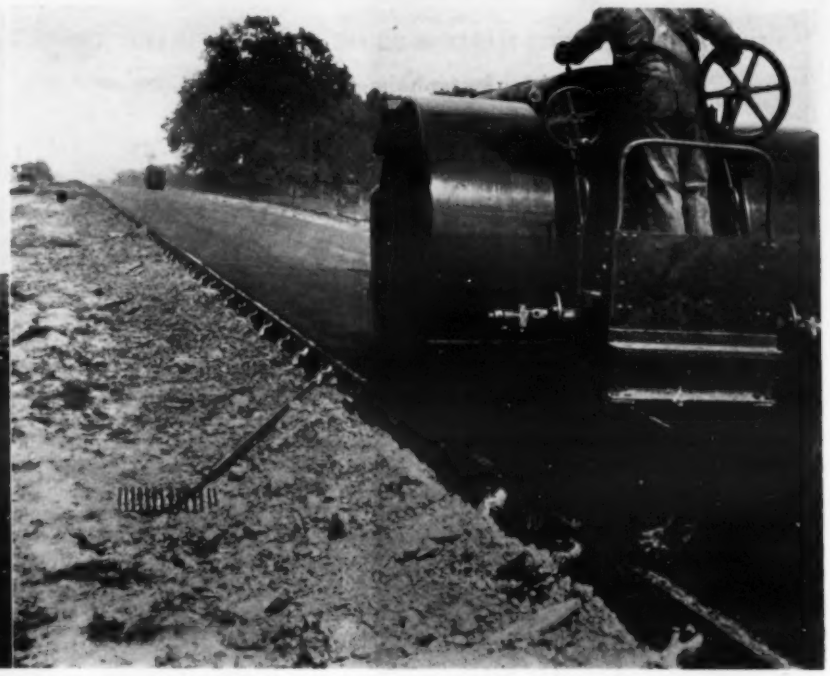
(Continued on page 25)

MOVING DIRT IN A BIG WAY AT TYGART DAM

Sutton Co., Inc., Subcontractor for the Excavation at Tygart Dam near Grafton, West Va., Is Using a Fleet of Caterpillar Diesel Tractors with Crawler Wagons and a Lorain Diesel Shovel. Frederick Snare Corp. is General Contractor for the Dam Which Will Be of Concrete, 220 Feet Wide at the Base and 217 Feet High.

A TEXACO ASPHALTIC CONCRETE WEARING SURFACE BEING LEVELED OFF BY MEANS OF A MECHANICAL SPREADER.

COMPACTING THE TEXACO ASPHALTIC CONCRETE MIX INTO A DENSE, TOUGH, SHOCK-ABSORBING HIGHWAY SURFACE.



The result

is a strong, resilient slab— ideal for trunk-highway traffic

Take scientifically graded aggregate, coat all particles uniformly with adhesive TEXACO Asphalt Cement, and thoroughly compact the mix with a heavy roller.

This is what you get: A tough, resilient slab, without joints, which absorbs the impact of heavy traffic, sheds water and ignores the seasonal ups and downs of the thermometer.

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Engineers—
Watch Your Step

Fortunately the condition we are going to discuss is not general among state employees in highway departments, but we want to take this opportunity to issue a warning to resident and project engineers that they may carry the message on to inspectors working out of their offices.

On NRH projects there seems to have crept in among some inspectors a feeling that this Federal money is just being spent to provide jobs so "why worry?" They convey this spirit to the laborers working from relief rolls on these jobs. The result is a spirit of indifference and carelessness being fostered among the laborers who ordinarily look up to engineers as a class of men whose whole life is given to the creation of works of useful service to the community. To lower themselves in the estimation of the laboring man is to lower the standing of the entire profession, for those men cannot, or do not, differentiate between the carelessly spoken word of an inspector and the word of the engineer in higher position, positions which we hope will be filled later with worthy men graduated from the ranks of instrument men and inspectors.

The incident that crystalized this thought occurred on an NRH job where, through some difficulty, the work had been shut down for nearly an hour before noon and the men had been hanging around waiting to go ahead. Promptly at noon everyone had lunch; then the Superintendent, wishing to lose as little time as possible in getting started again, called to the operators about seven minutes before starting time to get the machines warmed up, thus saving the usual time after the end of the lunch period. The inspector, in an offhand manner, said to the laborers, "What is he trying to do, get some extra work out of you? If I were you I wouldn't move until it is time to start."

That young man should realize that the taxpayers of this country are providing the money to make these public works projects possible that he, as well as the unemployed of the community, may have work in these times when state and local governments have found it difficult to meet the demands for work relief. He was lowering himself, reducing his own capacity to work effectively, and creating an unfortunate attitude in the minds of the laborers whom he addressed. This is a time for every one to boost, work a little more than he feels he is paid to and engender a feeling of confidence in the engineering profession which is doing more than any other to lift this country out of the economic difficulties in which it has been mired for the last five years.

Be a booster, create *men* out of the discouraged laborers who have found some hope in the relief projects; don't make lazy disgruntled parasites out of them.

Are the Tandem Paver Jobs Standing Up?

On April 27 we had a chance to inspect a concrete paving job that we had seen poured on July 15, 1931, near Atlantic, Iowa. The contractor was C. F. Lytle Construction Co., of Sioux City, Iowa, and the outfit was laying down 1,800 feet of road every 12 hours. We drove over the pavement at varying speeds, looked over the slab for cracks and other defects. It was remarkably free of any evidence of disintegration or roughness due to the speed with which the slab was poured.

At the time this work was under way tandem pavers were in use in a number of the mid-west states. The concrete slabs were literally pouring forth onto the highways from these combined units. The problem of finishing the slab satisfactorily was a real one and most of the contractors used two finishing machines and a couple of extra hand finishers.

On every hand in 1931 we met the query, "Will the concrete poured at that pace, and finished so late after pouring stand up?" The answer seems to be that the contractors knew what they were doing and that the state inspection was adequate to produce pavements that are standing up and are a credit to the contractors and states that produced them.

Under the present economic situation we shall not see more tandem paver outfits working. They are ruled out in many states and in others where the contracts are only five miles or less in length they would not be feasible. We have, however, this spring seen two pavers working side by side pouring 10-foot strip in Nebraska, and two in Missouri pouring 20-foot slab, doing it at a very creditable pace.

School for Relief Labor Started by Contractor

In 1934, a well established steel fabricator, with wide experience in field erection, built the superstructure for a 200-foot span bridge over a small river in Illinois, securing the labor from the local county unemployment agency. One man after another, who had registered as a steel erector, was tried out and discharged. Each time the agency, without any regard for the contractor, sent another registered man to fill the vacancy. There was not one man on the entire list really qualified as a steel erector. For the first three weeks of the job no progress was made whatsoever.

As a last resort, the contractor selected a group of men who seemed most adaptable and started a school of instruction to teach the men the essential rudiments of the work in which they claimed to be skilled. This proved to be an effective and constructive effort on the part of the contractor, although the delay involved in getting work started trebled the contractor's estimated costs and necessitated the postponement of the completion date.

Contractor Refused to Bid When Charged for Plans

To the Editor
Contractors and Engineers Monthly

We note with particular interest the letters in the April copy of your publication pertaining to the injustice of the architects' and engineers' "racket" of charging bidders for the use of plans when they are submitting an estimate on proposed work. As far as we can see, there is not one single valid excuse for this practice, especially when dealing with *invited* bidders.

The reason frequently advanced by these architects and engineers is that they are paid by the owner to furnish a specific number of sets of plans, and when the list of bidders exceeds this number there is no other way to meet the cost of typing, blueprinting, etc. Certainly, if the number of bidders is increased, chances of getting the lowest possible bid are correspondingly increased, and the factors are all still of greatest advantage to the owner; therefore, if he accepts the bids, he should be prepared to furnish the necessary plans and specifications.

Of course, what we are objecting to is the practice of making a *net charge* for the use of plans, and not the custom of requesting a deposit which will be returned *in full*. Then too, if a comprehensive quantity survey is included, there seems to be some justification for a *small* charge, but otherwise, we feel it an imposition which has absolutely no foundation on justice or business ethics.

We are so firmly convinced of the fairness of our attitude that we recently refused to bid on one of the largest local jobs which has come up this season. If you know of any organized movement to wipe out this unethical nuisance, and we can be of any help, please be assured of our full support and cooperation.

W. M. Bisson,
General Contractor.

Laconia, N. H.
May 25, 1935.

Charges Are Fair to All

To the Editor
Contractors and Engineers Monthly

In reply to the letter regarding a charge for plans and specifications furnished by engineers and architects for bidding, let me give you the following statement of our views on this matter.

When we have seven or eight bidders on fair-sized contracts, we have no objections to paying for the blue prints and the mimeographed specifications out of our engineering fees.

However it has been our experience that if the entire deposit is returned, we are beseiged by requests for plans and specifications. These requests come not only from legitimate contractor bidders but they also come from manufacturers of equipment and material firms. In some instances where we have agreed to return the entire deposit we have issued as many as 60 sets of plans and specifications on a contract amounting to less than $50,000.

It must be apparent to every one interested that such a situation is distinctly unfair to the engineer in charge of the work. Engineering fees can not ordinarily be increased to take care of such a situation. Our present practice, therefore, is to require a reasonable deposit for plans and specifications and to return to those taking out plans and specifications all of the deposit except a nominal amount sufficient to pay for the blue printing and mimeographing.

We feel that such a practice is in the interest of competent reliable contractors. It tends to eliminate the competition of irresponsible contractors and "chiselers."

We maintain one room in our offices for the benefit of contractors, material men and equipment manufacturers interested in the work which we have up for letting. They are free to use our office copies of the plans and specifications in that room without charge. We make no charge for a bidding blank only.

We have had no criticism from any contractors, manufacturers or material firms regarding our practice in matters of this kind.

Arthur W. Consoer
Consoer Townsend & Quinlan
Consulting Engineers

Chicago, Ill. June, 1935

Courtesy of Consolidated News Features, Inc., Copyright, 1935

"Will you pour, Mr. Hogan?"

"Why Not Divert?" Answered With Forceful Arguments

"Why Not Divert?" asks the Editor of the Hartford, Conn., *Courant* in an editorial discussing what shall be done to raise new revenue which the State of Connecticut needs. His suggestion that the most satisfactory solution to the problem would be the diversion of at least half of the $14,000,000 highway fund received from automobile registrations, operators' licenses and the gasoline tax has brought forth protest from many sources.

One conclusive answer, with nine points, to the question "Why Not Divert?" appeared in a recent issue of *The Nerba*, in which we concur heartily. The highway fund should not be diverted to the purposes of relief because:

1. Diversion breaks faith with the motor vehicle taxpayer.
2. Taxes levied for highway use should be applied for highway purposes.
3. Diversion subjects the motorists to double taxation and imposes on them as a class a disproportionate share of the cost of government. Motorists pay their share of the general cost of government in their ordinary capacity as payers of general taxes. Motor taxes are special additional levies for a special purpose and their application to anything but that particular purpose constitutes discrimination.
4. Diversion creates resistance to proper and needed highway-user taxes.
5. Ownership of automobiles is largely by persons in the low-income class, and is neither evidence of wealth nor a standard of ability to pay taxes.
6. It puts in jeopardy the large investment in highways, since the tendency is, when diversion occurs, to neglect or defer maintenance.
7. Diversion encourages the use of road funds as a pork barrel for political adventures.
8. Diversion will cause the loss of a portion of future Federal Aid, under the provisions of the Hayden-Cartwright Act.
9. Diversion of road funds to other governmental needs, undertaken as a temporary expedient, merely dodges the issue and tends to delay the overhauling of tax structures in the interest of stability, dependability and equity.

Peat Displacement By Positive Methods

Kind of Fill Material And Timing of Steps Given Emphasis

CAREFUL study of the behavior of highway embankments constructed over peat marshes was begun in the summer of 1925 by the Michigan State Highway Department. These studies have been continued each year until at present there has been developed a general method of handling peat displacement which seems to be positive and easily controlled.

J. W. Cushing, Research and Testing Engineer, and O. L. Stokstad, Soils Engineer of the Michigan State Highway Department, presented a report before the Highway Research Council in December 1934 on this subject. They placed emphasis on such factors as the kind of fill material to use and the proper timing of steps in the construction of the embankment.

The latter factor is important because it gives the maximum advantage which may result from the fluid character of peat and the greater weight of the fill. To avoid having to deal with comparatively dry and compact peat such as forms below a heavy embankment, special attention is given to filling. The high pressure in the peat at this point is being continuously relieved by mechanical excavation. Maximum fill weight is applied by building up the fill to surcharge grade or more by the end dump method. Even when the peat is completely excavated there is a proper time for placing the backfill, especially when the excavation is deeper than 3 or 4 feet. The fill should be placed as the peat is being excavated so as to prevent the sides of the excavation from sliding into the trench and the accumulation of disturbed peat in front of the backfill which, if allowed to collect, will become partly buried from time to time, causing weak spots in the embankment, and later slipping.

Proper Fill Material

The necessity for choosing proper material for filling purposes cannot be overemphasized. Many of the more recent failures over peat swamps in Michigan are due to the warping or shifting of clay embankments rather than to movement in the underlying peat. Sandy gravelly soils when they are available should be used for fill. On some heavily traveled roads where detours and temporary surfacings are a serious consideration, as much as a 3-mile haul may be justifiable in order to avoid a clay backfill.

Method

After the embankment has been constructed to surcharge grade and the surcharge is to be left in place for a short time, level readings are taken at regular intervals to determine the rate and amount of settlement. As soon as progressive settlement has stopped, the surcharge is removed and the grade left for a period of about three months in order that a new equilibrium may be established between peat and fill. It is also important that the portion of the fill which will support the future slab may be exposed to the elements of weathering and reach a uniform compaction before the surfacing is placed. When the construction procedure results in total peat displacement, as the filling progresses, the surcharge is not left in place but is moved forward with a bulldozer so that only from 25 to 50 feet of the embankment rests under surcharge at any time.

A temporary surface is often placed when it is necessary to route traffic over a recently constructed embank-

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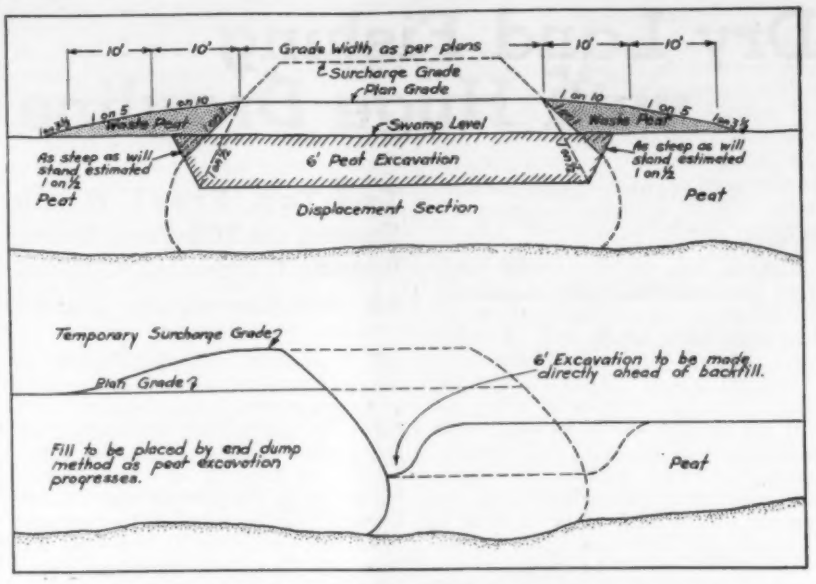
A COST SUMMARY OF METHODS USED IN THE CONSTRUCTION OF HIGHWAY EMBANKMENTS ACROSS PEAT SWAMPS

Method Used	No. of Swamps Considered	Total Yds. Sub. Fill	Total Cost	Cost Per Cu. Yd. Sub. Fill*
Partial Excavation with Surcharge..... (Michigan)	4	117,955	12444.88	.1055
Water Jetting—Costs include some special peat excavation..... (Michigan)	9	479,077	28282.93	.0787
Dynamite and Surcharge —Deep shooting used (Michigan)	13	157,038	14531.03	.0925
Trench Blasting and Deep Shooting..... (Minnesota)	44	628,513	63865.66	.1016
Stabilizing Oil Fill in Place—Relief trenching and deep shooting (Minnesota)	13	169,684	21296.88	.1363
Combination of Mechanical Excavating and Dynamiting..... (Minnesota)	25	394,407	49253.07	.1249

*Sub-fill refers to that part of the highway embankment which is located below the original swamp level.



Diagrams Showing Method of Partial Excavation and Surcharge for Peat Displacement Used by Michigan

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There are no expensive chains, racks and pinions to replace or adjust for the Northwest Independent Crowd. The Crowd Cable is a part of your old hoist Cable!

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The world's largest exclusive builders of gasoline, oil, diesel or electric powered shovels, cranes, draglines, pullshovels and skimmers

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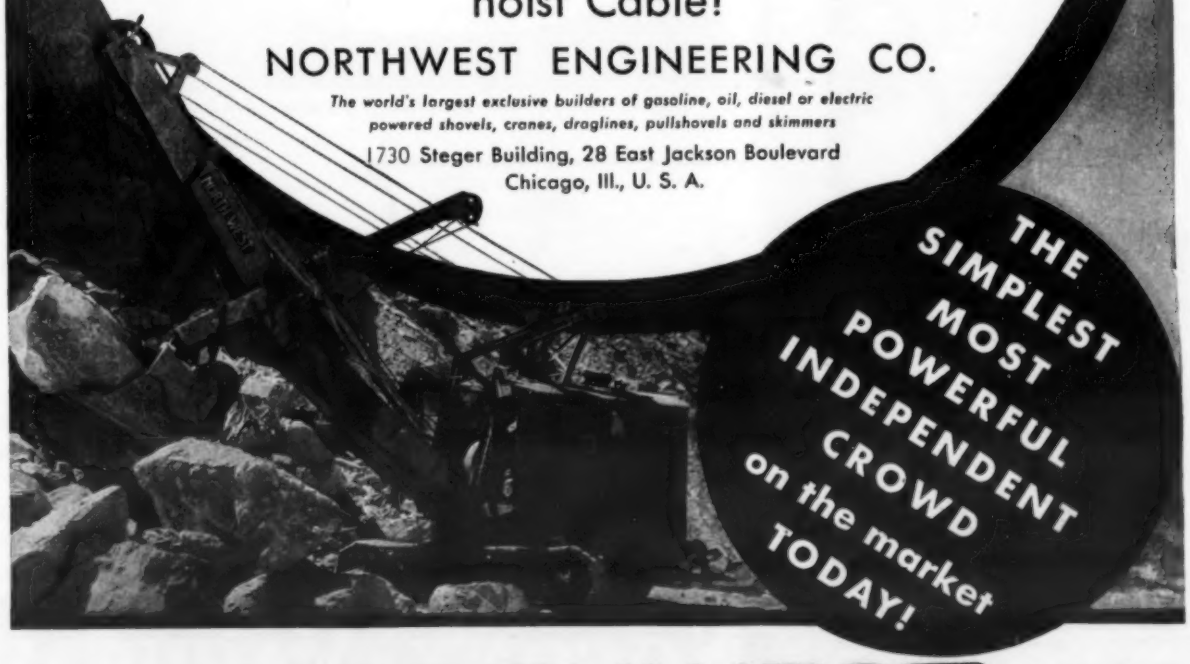

THE SIMPLEST MOST POWERFUL INDEPENDENT CROWD on the market TODAY!

SHOVELS, CRANES
DRAGLINES
PULLSHOVELS
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NORTHWEST

GASOLINE, OIL
DIESEL OR
ELECTRIC
POWERED

BUILT IN A RANGE OF 10 SIZES—1/2 YD. CAPACITY AND LARGER

Dry Land Fishing with Huge Dragline

By JOSEPH C. COYLE

THE 80-mile All-American Canal, which is, to banish drought conditions from Imperial Valley, California, by delivering a plentiful supply of the irrigation water which will be stored behind Hoover Dam, is well under way. It will run near to and parallel with the Mexican border for about 15 miles, and will cut through the picturesque sand dunes near U.S. Route 80, in California, just west of Yuma, Arizona. The widest part of the canal will be 160 feet at the bottom, with a bank slope of 2 to 1. Through parts of the sand dunes a depth of about 100 feet will be reached by the excavation, some of the dunes being 80 feet deep. It is the largest canal yet undertaken by the United States Bureau of Reclamation, but it will diminish in size as water is removed from it for various purposes. Among other projects, a branch canal is to be built later to water the Coachella Valley in southeastern California.

39,390,000 Yards of Excavation

The W. E. Callahan Construction Co., of St. Louis, and Gunther & Shirley, of Omaha, Nebraska, were awarded 30 miles of the canal, between Laguna Dam, north of Yuma, and a point west of the sand dunes (exclusive of Schedule 7) for $4,859,587.50, involving 39,390,000 cubic yards of excavation. Starting December 11, 1934, at two different points, the company, on May 1, had excavated over 2,200,000 cubic yards on Schedule 1 near Potholes, and over 2,300,000 cubic yards on Schedule 4 near Andrade.

A 10-W Bucyrus-Monighan dragline, with 12-cubic yard dipper and 165-foot boom is used on each of these jobs, with three 6-W machines of the same make and also some small crawler-type draglines, engaged in sloping. In some places extensive fill has to be made, but the swing of the 165-foot boom is ordinarily sufficient to move the material from adjacent cuts in one cast. Lime lines are used to outline the borders of the canal for machine operators,

Ten-Ton Steel Hook Swung on 165-Foot Boom Breaks Cemented Gravel on All-American Canal

and a pit man is employed to direct the placing of the big bucket. Leveling and similar work is done by diesel Seventy-Five Caterpillars, equipped with LeTourneau bulldozers. Smaller Caterpillars are used to service machines. Dipper teeth, designed by Major L. D. Crawford, are furnished by the Bucyrus-Monighan Co., Esco, H & L Co., and American Manganese Steel Co.

There's always tough going somewhere, and in the case of the Callahan Company's contract it was found in patches of rock and hard cemented gravel. The first, of course, must usually be blasted, and the cement gravel was also blasted at first. Sometimes the patch of gravel was not extensive, yet it involved delay to the big machines while a drilling and blasting crew was summoned to loosen the place up so that the big dipper would take it. The stuff was just a little too hard for digging, yet the crumbly nature of it made drilling a rather difficult job.

"Goin' Fishin'"

In order to eliminate the delay an enormous "fish-hook" was designed by Major Crawford, and now when the digging gets too hard the machine operator simply "goes fishing." Balanced perfectly, the giant hook is attached to the sling in the same way as the big dipper, and as if guided by some unseen hand, it glides into the hardpan to a depth of 6 feet, as a pull is taken on the main cable, loosening the ground as

(Continued on page 15)

Merrill Pacific Coast Mgr.

M. H. Merrill, who for the past three years has served as Consulting Engineer in San Francisco for the Robert W. Hunt Co., has been appointed Manager of the company's Western Office in San Francisco, to succeed F. M. Randlett who was recently elected Vice President and General Manager of the company.

COMPLETE
CUTTING AND WELDING APPARATUS

for all types of light and heavy work. Torches, tips regulators, hose, goggles, gloves, lighters and wrenches. Low prices—highest quality materials and workmanship.

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Specifications and all other particulars furnished on request.

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FURNISHED in various sizes, external and internal, for jobs of all types and sizes, JACKSON CONCRETE VIBRATORS are sturdier . . . easier to handle . . . more dependable . . . more economical to operate and maintain . . . place denser, stronger concrete with marked savings in cement and labor. Furnished with portable power plants if desired. Write for information. ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICHIGAN.

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Development of the Motorized Grader

By A. O. TECKEMEYER
of The Austin-Western Road Machinery Co.

Right after the Great War, when road-building was resumed, contractors faced a shortage of labor. Partly because of this condition a machine to eliminate a good deal of hand work in grading between forms was developed. This was a Grader with a self-contained power unit ahead of the blade unit—a combination tractor grader. Since a two unit grader and tractor was too cumbersome to use between the forms and could not be turned readily, nor backed up, this made quite logical the placement of the blade ahead of the power unit, all carried on one frame. Originally steel tired wheels were used. The operator sat directly above the blade so that he had a direct view of his work and could control his tractor from the seat. Thus one man operated the complete unit and it was generally called a "One-Man Grader." The machine was so practical that the field was enlarged to include the maintenance of roads. One man with a power grader could maintain the same number of miles of roads that four separate horse-drawn patrol units could cover at a saving of approximately 50%.

Refinements of Design

As the use of the one-man power grader developed and the low cost operation of this unit was discovered, improvements were made—First the control of the machine was changed from center to rear for it was found that the operation of the machine and the visibility was such that a man could operate the unit more efficiently from a control back of the motor. The power plant was originally a 20 h.p. engine, but as improvements were made in design additional power was added: first to 30 h.p., then to 42 h.p. until at present such machines are designed with 53 h.p. motors. From the steel tired wheels originally used, the next step was to solid rubber. At about the same time crawler tracks were used for the driving power. The use of crawlers however involved a number of problems, and the cost of maintenance over the number of miles the patrol grader operated proved expensive. As a result of these handicaps there was developed a set of four driving wheels on the rear, affording additional traction and stability for the machine. As pneumatic tires were developed they supplanted solid rubber tires and among other advantages afforded a means of using four tires on the Single Drive and eight on the dual or four-wheel drive machine.

During this gradual evolution of the motor grader various new uses were discovered. The speed of operation and ease of control made it eminently suitable for scarifying.

Another attachment that was developed with merit was the front V-type Snow Plow. This increased the use of the machine considerably because the ordinary type of road grading equipment could be used only during the construction or maintenance season, whereas the Motor Grader with the snow plow and the blade could be used 12 months of the year.

Hydraulic Controls

Having power available caused engineers to wonder why some of this couldn't be made to operate the various controls, thus increasing the use and efficiency of the Motor Grader. Such an improvement would enable the operator to do more work with less effort, increase the work done and improve

Advertisement

the character of the work. The use of hydraulic and mechanical power control was a jump of just a few years ago. The power controls were made to operate the various blade movements such as raising and lowering the blade and scarifier, side shifting and reversing of the blade. The only manual control remaining was the steering of the machine. But the application by Austin-Western of hydraulic power controls facilitated the easy adoption of the hydraulic steer so that now Motor Graders are available with every control accomplished through small levers which can be operated with the pressure of one finger.

Along with the improved operation of the controls and new design of the drive arrangement, additional stability was built into the Motor Grader. In place of working only on top of the road, the machine could be used for ditch work and rough grading. The development of the wide front axle and leaning wheel provided stability for the front end to enable the machine to cut a ditch line.

Another refinement of Motor Grader design was the addition of wider range speed adjustments. Originally the machines had three-speed transmissions of 1 to 4 miles per hour. The present Motor Grader uses six speeds forward and has a range of speeds from 1½ to 13 miles per hour and two speeds reverse, enabling each job to be done at the most economical speed.

Wide Field of Usefulness

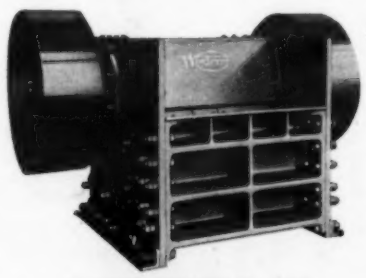
Motor Graders are used now by all who have ever used any type of road machinery. The Lane Company of Connecticut, McDonald Construction Company of New York, the Atkinson Paving Company of Portland, Oregon, the Inland Construction Company of Omaha, Sam E. Finley of Atlanta, Georgia, and Frederickson and Watson of California, are all contractors using one or more modern power controlled four-wheel Drive Motor Graders on their work. Practically every State government operates a Motor Grader, and some employ as many as five hundred. Pennsylvania has used Motor Graders in the development of its program which required the taking over of many miles of town roads. Cities and villages use them for maintaining and building outlying streets as well as for snow removal work, and with the addition of a bulldozer on the front of the machine, have given them the job of keeping city dumps level. Counties use the machine for maintaining, oil mix, cleaning of ditches, and snow removal work.

The present powerful hydraulically controlled Motor Grader with eight driving tires signifies progress in the highest degree because it means more work accomplished at less cost.

80,000 YARDS IN 70 DAYS

The Key to Austin-Western No. 100's 100-Yards-Per-Hour Performance

Users' Confidence in No. 100 Portable Crushing-Screening Plant Backed up by Convincing Operating Records



PRIMARY BREAKER No. 940
This jaw-type Austin-Western Crusher gives you larger capacity. With roller bearings of the finest type, it operates at full capacity continuously, without any trouble.

ROLL CRUSHER No. 3018
Supplements the No. 940 Crusher in the No. 100 Plant when fine-reduction crushing is done. Roll diameter (with manganese shells) 30 inches, face 18 inches. Speed 60 R.P.M.; horsepower 50.

● Davies & Sons, contractors of Abilene, Texas, are thoroughly satisfied operators of an Austin-Western No. 100 Plant. They report: "Over a period of 70 working days the plant has maintained an average of well over 1000 yards per 10 hour day, 40% crushing. Gas and oil $10 per day; repairs negligible."

"Material can be produced much cheaper with the Austin-Western No. 100 Portable Crushing and Screening Plant, than with any other I have known," says Ed. J. Murphy, Kaukauna, Wis., who has been in the gravel and crushed stone business since 1924.

Umatilla County, Oregon, writes: "The No. 100 Plant has crushed a total of 28,078 cubic yards to 1 inch minus from pits averaging about 85% oversize, a total of 330 cubic yards per day for the 85 days the plant has been started. This plant has been moved and set up three different times. It takes an average of one and one-half days to move five or ten miles and start crushing out of a new pit. Enables Umatilla County to produce more yardage for less cost per yard than we were able to do with the non-portable equipment. The savings on moves, set-ups and increased yardage will more than pay for the No. 100 Plant in two seasons."

"1500 yards in 10 hours; $10 labor costs." "Average capacity for 10 hours is 1200 yards, and if crushing does not exceed 25% same can be increased to 1500 yards—and I can assure you material is plenty hard. Three men can operate machine at labor cost of $10 per day," reports Superintendent E. S. Bowden on the No. 100 Portable Plant of the Trinity Farm Gravel Co., Eden, Texas.

Tear out and send the attached coupon today. Safest way to buy a crusher is to ask present users. Easiest way to ask users of the No. 100 is to ask Austin-Western to see their file of users' operating reports and letters. Use the coupon.

The Austin-Western Road Machinery Co.
Y, Aurora, Illinois
Please: ☐ Send me complete information on the No. 100 Portable Crushing-Screening Plant. ☐ Have a representative call on me, with users' performance records and reports.
Name.....
Company.....
Address.....State.....458
City.....

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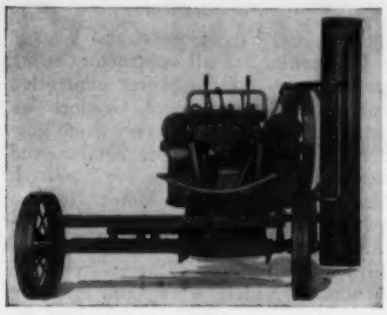


Extreme Blade Adjustment Is Possible with the New Adams Grader

Leaning-Wheel Graders With a Wider Blade Range

Four new leaning wheel graders have been announced by J. D. Adams Co., Indianapolis, Ind., in conjunction with the observance of its fiftieth anniversary. These graders feature a new all-welded box-type frame made of heavy ship channels, which is claimed to be more rigid and twice as strong against twisting stresses as previous Adams frames and affords new operating advantages.

From the front end of the frame to a point well back of the blade circle, where it spreads to connect to the rear axle, the frame is only 7 inches wide, permitting free rotation and throw of the blade-lift arms and lift links so that the blade can be swung from ditching position to perpendicular without any adjustment of the lift links. The narrow frame affords greater visibility so that the operator can always see the full length of the blade and observe his work.

Built-in anti-coasting devices are provided on operating adjustments which automatically lock the adjustments in position until changed by the operator. On power-controlled machines the control which sets the angle of the blade is self-locking in any position, using no locking pin, and the angle of the blade can be adjusted quickly while the blade is at work.

The new bladers are offered in 10 and 12-foot blade lengths with hand or power-operated controls. With power the blade is raised from plowing position to perpendicular in 40 seconds.

R. S. Armstrong & Bro. Co. Made Bucyrus-Erie Dealer

Bucyrus-Erie Co., So. Milwaukee, Wis., has announced the appointment of R. S. Armstrong & Bro. Co., 676 Marietta St., N.W., Atlanta, Ga., as distributor for the sale of power shovels, draglines, cranes, clamshells, drag shovel and skimmer scoops in the state of Georgia. This new distributor will carry the complete stock of repair parts for current machines and furnish excavating equipment from ⅜ to 2-yard capacity.

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including Bridge deck slabs, Dams and Locks, Highway pavement and Concrete products.

Write for circulars and engineering data.

MUNSELL CONCRETE VIBRATORS

907 West 51st Ave. Jersey City, N. J

Attractive Steel Bridges Receive Annual Awards

(Photo on page 44)

The stainless steel plaques awarded annually by the American Institute of Steel Construction for the most beautiful steel bridges built during the past year will be affixed to the new Bourne Bridge across the Cape Cod Canal at Bourne, Mass., and Douglas County Bridge No. 667, a grade separation structure on Road 44 and the Dodge Arterial Highway, near Omaha, Nebr.

The awards are made in three classes: Class A, including bridges costing $1,000,000 and over; Class B, embracing bridges costing from $250,000 to $1,000,000; and Class C, including bridges costing less than $250,000. Awards this year were made only in Class A and Class C.

The prize-winning bridge in Class A, the Bourne Bridge over the Cape Cod Canal, was designed by Fay, Spoffard and Thorndike, Engineers, and fabricated by the American Bridge Co., and is a Federal Works project built under the supervision of the Corps of Engineers, U. S. Army. The three main spans of this structure are of the continuous type, with an arch over the Canal. The prize winning bridge in Class C, the Douglas County Bridge, was designed by Guy Dorsey, Assistant County Surveyor and fabricated by the Omaha Steel Works.

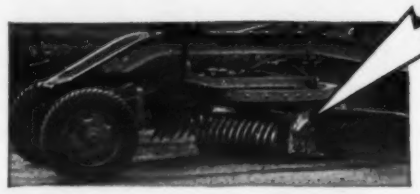
Construction Equipment Co. Made Link-Belt Dealer

The Link-Belt Co., Chicago, Ill., has announced the appointment of Construction Equipment Co., 2274 Main St., Hartford, Conn., as the authorized distributor of Link-Belt crawler-mounted shovels, cranes, draglines, and track-type locomotive cranes. The company is headed by George L. Kaeser.

BAKER DISC GRADER ATTACHMENT

Cuts out corrugations and wavy surfaces on all kinds of low-cost roads and streets. Makes a new machine out of your grader.

FITS ON MOLDBOARD OF ANY ROAD GRADER OR MOTOR PATROL



Nothing to take off your grader. Clamps on in a few minutes.

Write for Bulletin No. 551.

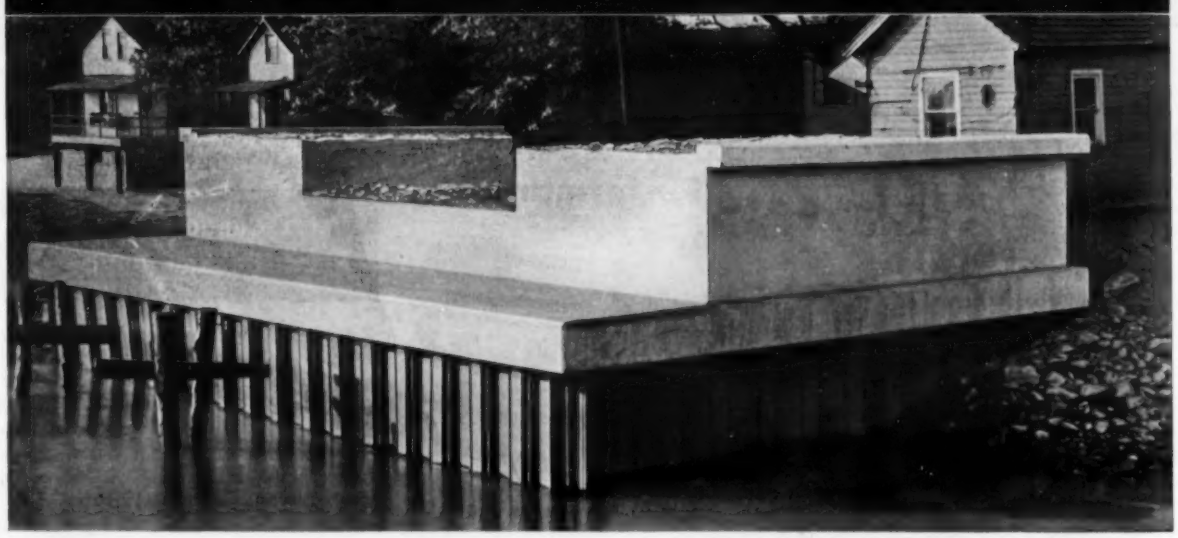
THE BAKER MFG. CO.

585 Stanford Ave., Springfield, Ill.

★

Old bridge abutments rebuilt . . . enlarged *using*

BETHLEHEM *Steel Sheet* PILING



BRIDGE abutments that are disintegrating and need replacing, or that must be enlarged because the bridge is to be widened, represent a problem often met with in highway modernization.

A case in point is the bridge across Rancocas Creek between Riverside and Delanco, New Jersey. This bridge was built in 1902, and the abutments had been undermined and were rapidly going to pieces. While rebuilding would have been necessary in any case, it happened that the bridge had to be widened, as it was a link in a through highway that was being modernized.

Here is a brief account of the way in which Kolyn Construction Co., Trenton, N.J., the general contractors, handled this job:

A wall of Bethlehem Steel Sheet Piling was driven about 10 ft. away from the face and sides of the old abutment. After bracing the sheet piling wall, the earth between it and the abutment was excavated, the water pumped out to about 13 ft. below mean low water, and timber piles driven.

Concrete was then poured, filling the space between the sheet piling wall and the abutment, and a concrete bridge seat constructed. Before pouring the concrete, steel dowels were placed in holes that had been drilled in the abutment, tying the new concrete to the old.

Both abutments were rebuilt and enlarged in this same way. The Bethlehem Steel Sheet Piling used was Section AP16, in 28-ft. lengths.

By using Bethlehem Sheet Piling costly removal of the old abutments was made unnecessary. Instead they were saved, and utilized as an integral part of the new structure. The new abutments, faced with steel sheet piling, will have very long life and will need no attention of any kind for many years. In addition, the sheet piling will prevent underscouring of the abutments by the current.

KALMAN STEEL CORPORATION

Subsidiary of Bethlehem Steel Corporation

GENERAL OFFICES: BETHLEHEM, PA.

Pacific Coast Distributor: PACIFIC COAST STEEL CORPORATION. Export Distributor: Bethlehem Steel Export Corporation, New York.

IN DEEP MUD, SAND, GUMBO

ROAD OR NO ROAD, THIS AMAZING NEW TIRE PULLS YOU THROUGH!

HERE'S a tire that makes its own road. It will pull your equipment through deep mud, sand, or over unimproved roads of any kind. It is the new Firestone Ground Grip Tire, built with a deeper, thicker and more rugged tread, with widely spaced self-cleaning bars of a new and tougher tread rubber.

This amazing new tire that gives you super-traction is built with 54% more rubber in the tread for greater grip and longer wear. Two extra layers of Gum-Dipped High Stretch cords hold the tread securely to the body of the tire, making a single unit of great strength.

The new line of Firestone Ground Grip Tires includes sizes and types for your truck, cars and tractors. See your nearest Firestone Service Store or Firestone Tire Dealer today. Let him show you how the new Firestone Ground Grip Tire will give you greater traction—more dependable and economical service.

Listen to the Voice of Firestone—featuring Margaret Speaks, soprano, and the Firestone Choral Symphony, with William Daly's Orchestra—every Monday night over N. B. C.—WEAF Network

1 Deep, rugged and tougher tread — is self cleaning
2 Two extra layers of Gum-Dipped cords to hold massive non-skid tread to tire body
3 Gum-Dipped cord body gives stamina for strains of heavy pulling at low pressures
4 Continuous bars prevent bumping on paved roads — Greater traction no chains needed

AUTO SUPPLIES AT BIG SAVINGS

TRUCK TYPE BATTERIES	SPARK PLUGS	BRAKE LINING

Firestone

© 1935, F. T. & R. Co.

New Levee Speeded With 5-Hour Shifts

(Photos on page 44)

Big Walker, Draglines with Crawler Wagons Moved 400,000 Yards a Month in Louisiana

AT Deer Park Bend on the west bank of the Mississippi River about 15 miles south of Natchez, Miss., or Vidalia, La., Harris, Brandenburg & Greeson began moving 1,600,000 yards of earth for 3 miles of new levee on April 22, 1934. Equipped with a large crawler wagon and tractor outfit for the longer haul of about 650 feet and a Bucyrus-Monighan for handling material from the closer riverside borrow pit, they moved about 400,000 yards a month, a figure which would have been larger except for unprecedented heavy summer rains in that section.

The Crawler Outfit

The fleet of crawler wagons and their tractors made an imposing array when drawn up between shifts for refueling. There were sixteen tractors of which ten were Model L Allis-Chalmers devoted exclusively to pulling the crawler wagons. There were also a Caterpillar Sixty-Five diesel, another Seventy-Five diesel, two Caterpillar Sixties for general service, and two Allis-Chalmers 35's with Baker bulldozers. The crawler wagons, of which there were fifteen, were grouped as follows: five 12-yard Euclid wagons, five 7-yard Euclid wagons, one 12-yard Trackson, and four 7-yard Tracksons. The wagons were all self-winders to save the added labor costs of winders at the NRA rate of 40 cents per hour.

The absence of any grade men on the dump was noted, all the work being done by the tractors and bulldozers. There were two spotters for the crawler wagons.

The crawler outfit built the base section of the new levee involving the handling of between 2,500 and 3,500 yards of dirt per station. The new levee built by this contractor, about 3 miles long, involved using about one mile of old levee, the remainder of the excavation being entirely from riverside borrow pits. The crawler outfit usually handled about 300,000 yards per month but was handicapped to the extent of about 25 per cent by the rains. On the crawler outfit, including the greasing and service crews, there were about 150 men working in each 24 hours.

Time Schedule and Lubrication

Instead of attempting a 24-hour working schedule this contractor worked the contract in four 5-hour shifts per day, leaving four hours for meals and emergency servicing and refueling. The shifts were: 7 a.m. to 12 noon, 1 p.m. to 6. p.m., 7 p.m. to midnight, and 1 a.m. to 6 a.m. During the noon and midnight periods the greasing foreman and his four laborers checked the oil and gas in each tractor. The gasoline was hauled to the line-up of tractors by a tank wagon pulled by a tractor and hand-pumped into the fuel tanks.

For greasing, the foreman pulled one outfit at a time out of the hauling group, being careful that no two successive outfits were taken from under the same dragline, and continued in this manner throughout the day until each outfit had been lubricated on the daylight shifts. The greasing was repeated on the night shifts in the same manner.

When the entire train or fleet of tractors had been stopped for refueling at noon or midnight the performance of cranking was dispensed with by simply hooking the gas wagon tractor to a line of tractors and wagons and pulling ahead until each tractor roared out its notice that the engine was going and ready for work. This is a somewhat similar performance to starting the old Quads during war times. Cranking those brutes was a heartbreaker so one in the fleet was kept warm during the night and used to butt the others around until the cold engines responded to this treatment.

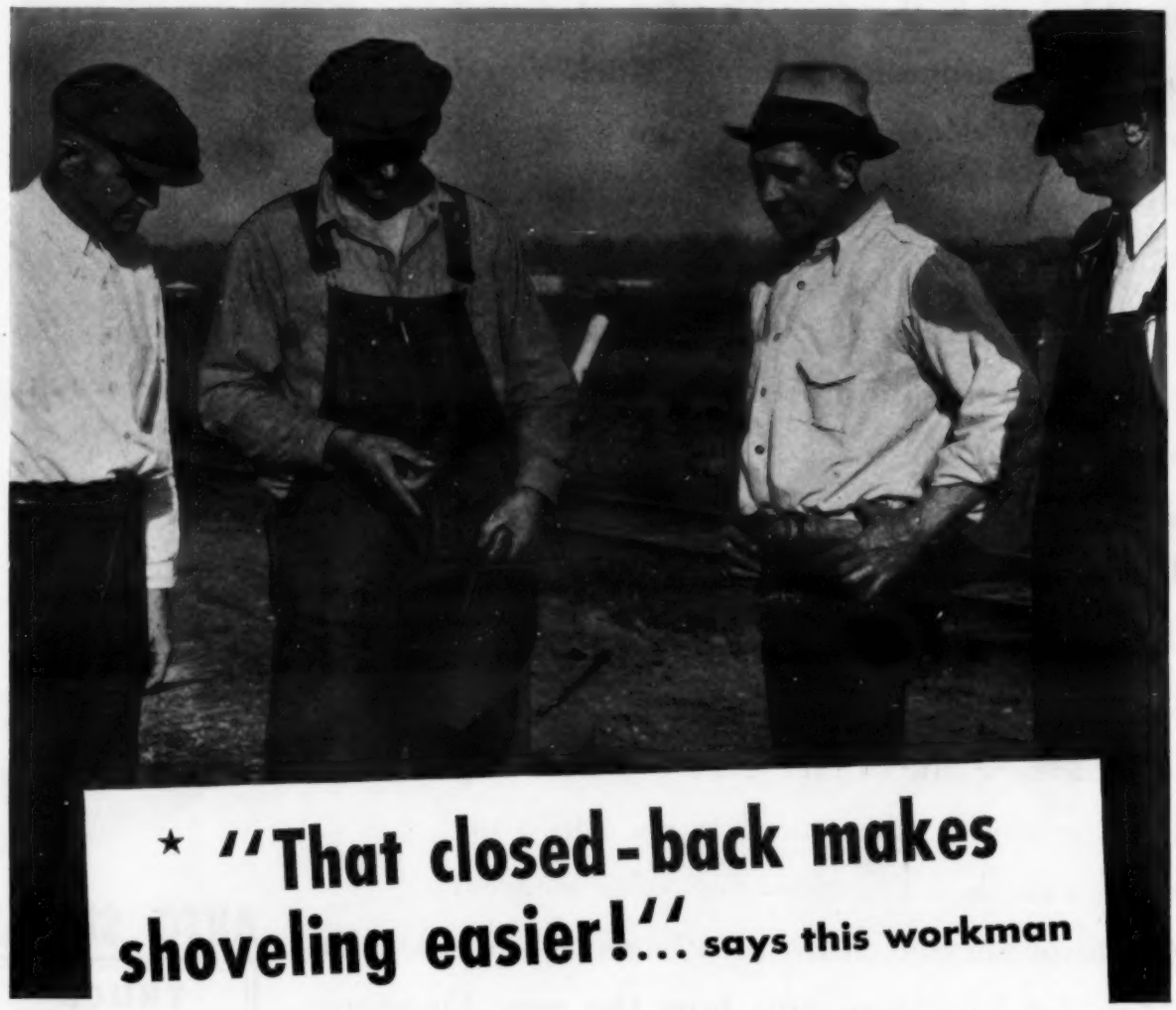
Loading with Draglines

When moving the old levee the four draglines remained on top and swung their loads of dirt into the crawler wagons. Later when the dirt was all taken from borrow pits the draglines stayed at ground level and the wagon outfits went into the pit for loading. The loading cycle for the draglines was about 15 seconds per swing and averaged from 45 seconds to 1 minute for loading the wagons, depending on the size. There were three or four tractor and wagon units for each dragline. There were two Northwest draglines with 45-foot booms, one Northwest with a 60-foot boom and one Link Belt with a 45-foot boom. Two of the machines were equipped with Omaha 2-yard buckets and the other two with slot bas-

(Continued on page 27)

C. & E. M. Photo

Dressing Slope with an Old-Time Crew of Darkies



★ "That closed-back makes shoveling easier!"... says this workman

"How do you like Wood's new CLOSED-BACK Shovel?" the Wood investigator asks workmen, to find out what actual shovel users think of this improved shovel.

"The insert on the CLOSED-BACK seems to make shoveling a whole lot easier!" answered Jim Whalen, 101 Detrich Avenue, Dayton, Ohio.

Jim, like many another workman has discovered how the resiliency, better balance, lightness, and dependable strength of Wood's new CLOSED-BACK makes grueling shovel work easier. Wood's sales show that shovel buyers, too, have already remarked this increased efficiency, perhaps learned these five reasons for it:

THE WOOD SHOVEL AND TOOL CO. "CLOSED BACK" PIQUA, OHIO, U.S.A.

1. *The Closed-Back Shovel* combines stress-defying one-piece design, the unrivaled strength of the heat-treated shank, and an absolutely smooth back. No strap welds to pull loose.
2. *The Turned Shoulder* strengthens blade, saves shoes.
3. *The Tapered Socket* gives strength and solidity where handle joins blade, fits the hand better.
4. *Heat Treating* makes the high-grade steels in Wood's "Moly," Big Fist, Wood and Stuart grades *hard*, to resist wear.
5. *Reduced Inventory:* The CLOSED-BACK Shovel *supersedes* strap weld, solid shank, and hollow-back shovels, makes it possible to cut your shovel inventory.

• • •

When buying shovels, consider Wood's Arrow-Point. Grinding wear can't dull the Arrow-Point's dig-in edge, or change its efficient shape . . . it lasts longer.

Buyers Beware! Wood's Engineers invented the CLOSED-BACK SHOVEL, developed the special welding process which fastens the CLOSED-BACK strip permanently without decarbonizing and weakening the blade. *This is an exclusive Wood process, used on no other shovels.*

Address The Wood Shovel and Tool Co., Piqua, Ohio, U. S. A.

WOOD'S

Shovels · spades · scoops

In these famous grades . . . "Moly" (Mo-lyb-den-um) . . . "Big Fist" . . . Wood . . . Stuart . . . Piqua

U. S. B. P. R. Engineers Win A. S. T. M. Award

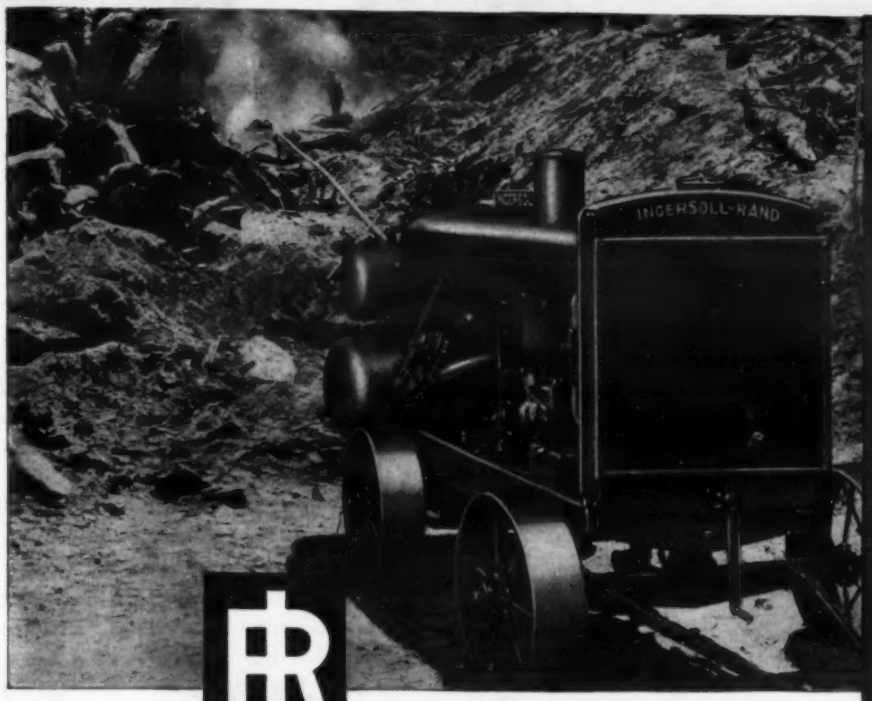
C. A. Hogentogler, Senior Highway Engineer, and E. A. Willis, Assistant Highway Engineer, U. S. Bureau of Public Roads, have been announced as the winners of the Charles B. Dudley Medal of the American Society for Testing Materials for 1935. This medal is awarded annually by the Society to the author or authors of the paper presented at the preceding annual meeting which is of outstanding merit and constitutes an original contribution to research in engineering materials. The winning paper, presented in 1934, was entitled, "Subgrade Soil Testing Methods." In the paper the authors evaluated methods for determining properties of subgrade soils, indicating the principles to be followed in the conduct of the tests and interpretation of results.

New Officers for Lauson Co.

The Lauson Corp., which has been operating under a receivership for the past three years, has now been taken over by The Lauson Co., New Holstein, Wis., incorporated under the laws of Wisconsin.

The officers of the new company are H. L. Wright, of Milwaukee, President; F. H. Edson, of New Holstein, Vice President and Sales Manager; C. O. Piper, New Holstein, Vice President and Factory Manager; H. D. Wirth, of Milwaukee, Secretary, and H. E. Bruns, of Plymouth, Wis., Treasurer. The new company will be amply financed.

The Lauson Co. manufactures a complete line of vertical air and water-cooled engines ranging from ½ to 5 hp, as well as horizontal models of 1½ to 18 hp, electric and gas-engine driven pump jacks, replacement feed grinders and tractors.



2 YEARS OF SERVICE prove THEIR EFFICIENCY!

IR the FIRST 2-Stage Air-Cooled PORTABLE COMPRESSORS

TWO years ago, after building and testing six separate, experimental machines we brought out the *Pioneer* 2-Stage Air-Cooled Portable Compressor.

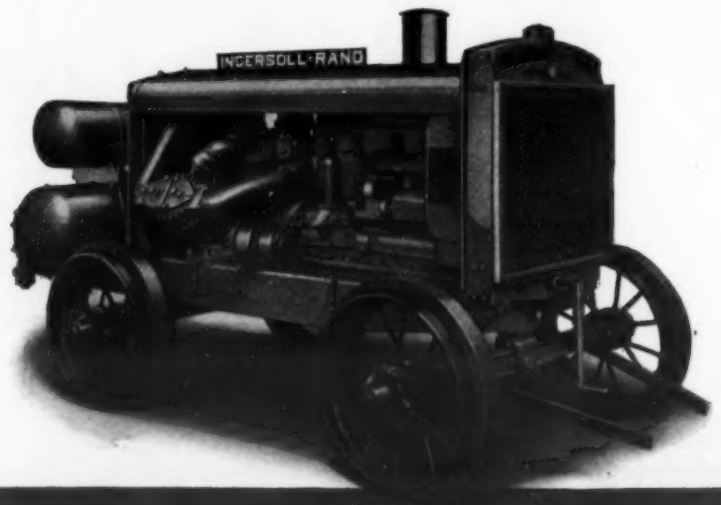
Today, this Compressor, after gruelling tests of actual service on all kinds of work under the most varied conditions, has more than justified every claim we made for it.

It is *time tested and service proved* equipment that embodies every worth while feature essential to economical, efficient and continuous operation.

Service has proved the statements we originally made—that the units use 25% less fuel per foot of air delivered over conventional single-stage water-cooled portables—and deliver 23% more air at 100 lbs. pressure.

The I-R Air-Cooled Intercooler, the Cushioned I-R Plate Valves, the Timken Main Bearings, etc., *made history* in portable compressor construction. The six sizes and six types of mountings permit the selecting of a machine for any set of conditions.

Full details upon request—write for new catalog 1604-E.



Together with these compressors I-R manufactures a complete line of *Air Operated Tools*

New Drills . . . Jackbits . . . Jackbit Grinders . . . Hoists . . . Diggers . . . Hammers . . . Rammers . . . Tampers . . . Saws . . . Borers . . . etc.

Write for newest general catalog for complete description.

139-2

Ingersoll-Rand

Penetration Project on Top-Soil Base

(Continued from page 1)

used. This outfit had a 16-foot carrier and delivered the material to light trucks. On the last 4 miles into Great Falls the "blue topping" followed right behind the shovel, using an Adams 10-foot blade grader with a Caterpillar Sixty pulling it.

Pulling in Top-Soil Base

A 12-inch loose top-soil base 22 feet wide was next placed and fine graded to within ½-inch of final grade. To get sufficient material, a total of 65,500 yards for the entire job, it was necessary to haul from between fifty and sixty top-soil pits along the right-of-way. An elevating grader was used to make the cuts which varied in depth from 4 to 18 inches, depending on the quality of the material. This material was hauled out to the road and spread by hand, then plowed and harrowed the full 12-inch depth and finally shaped up with two pulled graders, an Adams 10-foot and a Stockland 12-foot, and worked over by a Caterpillar 66 power grader with a 12-foot blade.

On various sections of the work when this character of operation was going on, other grading units were used, including a Caterpillar Super Mogul 12-foot blade, a Stockland 85 12-foot blade and a Caterpillar No. 11 motor patrol. The tractor equipment included a Caterpillar Sixty, three Caterpillar Thirties, an Allis-Chalmers 50, and two Caterpillar Fifty diesels for the elevating grader.

Priming the Base

The new top-soil base was prepared for priming by a final blading with the Caterpillar No. 11 patrol grader which pushed the excess material into a windrow at the edges of the road. This was followed by a crew of six men hand-sweeping the base to remove all coarse material that was loose on the surface. A man followed this group, opening drains through the windrows at the edge of the base so that sudden showers could drain off quickly and not delay progress by softening the base.

The fines and dust were removed by an effective blower built for the contractor by the Gibbs Machinery Co. of Columbia, S. C. It consisted of a Champion blower direct-connected through the transmission to a Packard engine and all mounted on a Chevrolet truck. The end of the blowing device was sheet metal, giving an opening 3 feet long by about 2 inches high which blew a wide jet of air under considerable pressure across the road. About four round trips with this machine resulted in a surface that was entirely free of any fines not well bonded to the base.

C. & E. M. Photo

Hood C. Worthy, Resident Engineer, (Left) and Turner Quillian, Superintendent

A tar prime was used on this contract. It was delivered in tank cars to a siding at Evans about one mile from the northwest end of the job and hauled for the upper 10 miles; then another siding at Great Falls was used and the hauling done from that end for the remainder of the job. The tar prime was furnished by the Riley Tar & Chemical Co. of Chattanooga, Tenn., from its Norfolk, Va., plant. Two Kinney distributors were used on this job, one a 600-gallon and the other an 800-gallon machine. Only one was used on prime and one for applying the first asphalt for the mat and then both were required for the seal.

The prime was received cold in the tank cars and heated in the distributor to about 140 degrees Fahrenheit for better priming although this was not required in the specifications. The prime was applied a 0.3 to 0.35 gallon per square yard 20 feet wide. Prior to the start of the application a man set a heavy twine line along the edge of the paved way and the distributor carried a tell-tale attached to the front bumper which the driver carefully ran along the twine to give the proper line of application. Immediately behind the distribu-

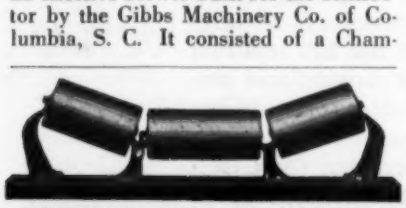
(Continued on page 20)

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD CO., 32-36 Dey St., New York

HAYWARD BUCKETS



"Conveigh" anti-friction closed end conveyor idlers furnished with ball or roller bearings and malleable iron brackets—mounted on plank or channel base. Arranged for pressure lubrication.

"CONWEIGH" CONVEYING EQUIPMENT

"Conveigh" originated the first anti-friction troughers and today "Conveigh" presents an advanced design which provides the ultimate in economy, performance and service. The new "Conveigh" catalog describes our line of troughing and return idlers, trippers and accessories. They will measure up to the most rigid requirements of the largest as well as the smallest job. We will gladly prepare layouts, sketches, blue prints and quotations upon request.

Our line of portable and semi-portable conveying equipment is described in our catalog of "Porta Conveyors."

PORTABLE MACHINERY CO.
Division of A. B. FARQUHAR CO., Limited
Box C-1, York, Pa.

FINISH the work as you go! Because of walking traction, Bucyrus-Monighans can excavate widths much greater than boom length—working from one side of the excavation only. After the maximum width from one location has been completed, the Walker backs away at right angles to the line of work, widening as it goes. With these fast-digging, all-weather machines, a section is complete when it has been worked once. No costly waste moving time. If you have a dragline job, consider the speed and economy you get with the Walker. Manufactured by Bucyrus-Monighan Company, Chicago, Ill.

Sold by

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

International Agreement on Testing Road Emulsions

At the World Petroleum Congress in London in 1933, a special Bituminous Emulsion Section was organized to examine the possibilities of putting the methods of tests of emulsions on an international basis. At the Congress it was found that there are no fundamental differences of opinion as to the essential qualities of bituminous emulsions for road purposes. It was then arranged to make cooperative tests on a single subdivided sample of emulsion by organizations in England, France, Germany, Holland and U. S. A. Test results were considered at a meeting in Brussels in August 1934 and a resolution was then prepared to present to the International Road Congress at Munich during September 1934. The resolution recommended the following tests for asphalt emulsions for use in road surfaces.

1. A test for water content by distillation with suitable solvent.
2. A test of inhomogeneity of dispersion.
3. A test for storage stability.
4. A test for coagulation of emulsion at low temperature under conditions which do not permit actual freezing solid of the emulsion.
5. A test for viscosity by means of the Engler Viscometer at 20 degrees C.
6. A test for rate of break of the emulsion on the road (lability of use) by a method employing evaporation of the water under conditions of mechanical agitation.

A committee was appointed for further study of the tests with a view to their publication in the Bulletin of the International Association.

—Highway Research Abstracts.

Highway Labor Has New 130-Hour Limit

(Continued from page 1)

ized by the Works Progress Administration.

(e) Except as specifically provided, workers who are qualified by training and experience to be assigned to work projects shall not be discriminated against on any grounds whatsoever.

(f) All works projects shall be conducted in accordance with safe working conditions and every effort shall be made for the prevention of accidents.

(g) Wages to be paid by the Federal Government may not be pledged or assigned, and any purported pledge or assignment shall be null and void.

Williams "DXL" Dragline Bucket
For More Yardage Per Day

Special alloy steel permits lighter yet stronger construction. Rugged reinforcement at points of stress and wear assures long life.

We also build Power-Arm and Multiple-Rope Clamshell Buckets for every purpose. Write for Bulletins.

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS BUCKETS

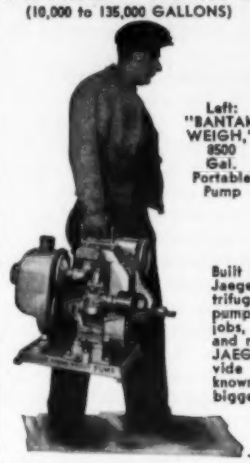
New General Sales Manager for Harnischfeger Corp.

Announcement has recently been made by the Harnischfeger Corp., Milwaukee, Wis., of the appointment of Charles W. Daniels as General Sales Manager for the entire line of P & H contractors' equipment, industrial products, P & H-Hansen arc welders, hoists, etc. Mr. Daniels was for several years with P & H in New York but most recently was in charge of the corporation's Philadelphia office. He is succeeded in Philadelphia by L. M. Stout.

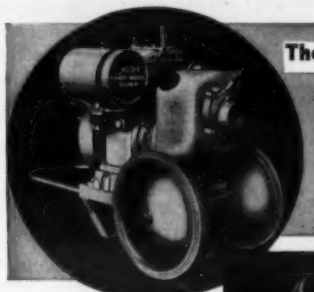
Jones & Laughlin Expand General Steel Service

Jones & Laughlin Steel Corp., Pittsburgh, Pa., recently announced an extension of its fabricating and warehouse service. Its subsidiary company, Jones & Laughlin Steel Service, Inc., has purchased the fabricating shop, warehouse and business of the National Bridge Works, Long Island City, N.Y. The new property will be operated under the direction of Harry B. Royer, formerly President and Manager of National Bridge Works. At present Jones & Laughlin Steel Service, Inc., operates warehouses in Pittsburgh, Chicago, Cincinnati, Detroit, Memphis and New Orleans.

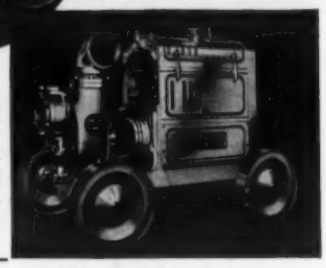
JAEGER "SURE PRIME" PUMPS
(10,000 to 135,000 GALLONS)



Left: "BANTAM WEIGH," 8500 Gal. Portable Pump



The "Handy Model"
LOWEST PRICED
8500 Gallon Pump Built



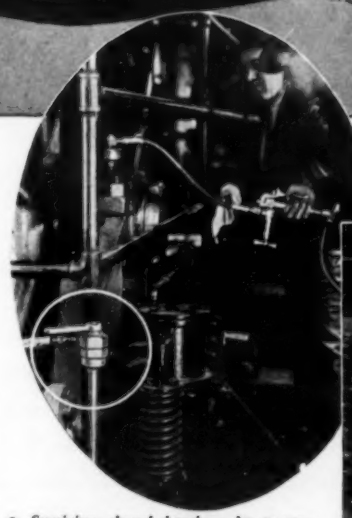
Built in 2", 3", 4", 6" and 8" sizes, Jaeger Heavy Duty Self-Priming Centrifugals are world's largest selling pumps of their type for construction jobs, industrial work, public utility and municipal maintenance, etc. JAEGER WELL POINT SYSTEMS provide "dry job" conditions at lowest known cost. Used on small jobs and biggest. Send for new CATALOG P-35.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

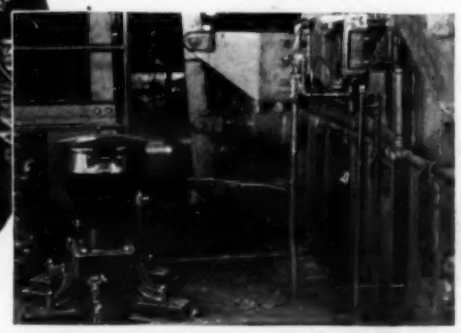
ON THE JOB WITH YOU
. . . ALEMITE POWERGUN LUBRICATION

Mounted on Your Truck or Trailer or in Your Shovel Cab

● *Alemite Powergun Lubrication Equipment mounted on truck and connected to gasoline-operated air compressor brings amazing savings.*



● *Servicing shovel bearings by power. Lubricant is piped from Powergun to shut-off valves (in circle)—quick connection made—and operator has TONS of pressure under finger-tip control.*



●*Stationary installation of Alemite "Rock Crusher" Powergun in a shovel cab with lubricant piped to convenient outlets.*

ALEMITE now makes the amazing money-saving features of Powergun Equipment available for use *in the field—on the job!* No longer is it necessary for contractors to be content with hand gun lubrication methods, simply because their machinery is operating beyond the reach of city power lines! For it is an established fact that where *four or more* units of Power Grading Equipment are in use, Alemite Powerguns, used in connection with gasoline-operated air compressors, will actually pay for themselves in lubricant, labor and time savings!

For quick, efficient lubrication of tractors, crawler-trailers, dump wagons, and similar equipment, Alemite recommends that Powergun Equipment be mounted on trucks or trailers. For shovels, stationary installation of a Powergun piping lubricant under pressure to a number of convenient outlets has *proved* its ability to cut costs.

Write today for complete information on the savings of Alemite Powergun Lubrication for contracting machinery "On the Job"—in any location. No obligation. Simply fill in the attached coupon and mail today.

ALEMITE
Reg. U.S. Pat. Off.
Controlled Application of the Correct Lubricant

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Without obligation, please send me complete information on the use of Alemite Powergun Equipment for contractors' machinery.

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*State*_____

Savage Made Sales Manager for Thew and Universal

The Thew Shovel Co., and The Universal Crane Co., Lorain, Ohio, have announced the appointment of D. G. Savage as Sales Manager in charge of all domestic sales. Mr. Savage has been with the Thew Shovel Co. for fifteen years, having spent the last eight years as Manager for southeastern and southwestern United States.

Other appointments within the company include S. E. Gill, who has been associated with Mr. Savage in Atlanta for eight years, as Southeastern District Manager; A. L. McLain as Southwestern District Manager; and R. H. Wilson, Assistant to the General Manager, has been placed in charge of the Eastern sales territory with offices at 500 Fifth Ave., New York.

The following new distributors have also been announced to represent the Thew and Universal line of shovels and cranes: Jeff Hunt Road Machinery Co., Columbia, S. C.; Yancey Brothers, Inc., Atlanta, Ga.; Yancey Tractor Co., Albany, Ga.; J. D. Pittman Tractor Co., Birmingham, Ala.; Central Illinois Tractor & Equipment Co., Springfield, Ill.; McDonald Tractor-Equipment Co., Orlando, Fla.; Burford-Toothaker Tractor & Equipment Co., Montgomery, Ala.; C. P. Camp Co., Tulsa, Okla.; and W. A. Nelson Equipment Co., Milwaukee, Wis.

A New Motor-Compressor

The similarity of air compressors to automobile engines prompted Gordon Smith to make some experiments with a Ford Model A engine which led to the present Smith motor-compressor made by Gordon Smith & Co., Inc., 1220 State St., Bowling Green, Ky. This machine is a self-driven compressor in that a Model A Ford motor is converted into a 2-cylinder engine and a 2-cylinder compressor. Cylinders 1 and 4 are used for power and cylinders 2 and 3 for compressing the air. The head has the same combustion space and water jacket over the power cylinders as the standard head. The special head has no water jacket over numbers 2 and 3 cylinders because this section has only the comparatively low heat from the compressed air. This middle section has no combustion chamber and only the slight piston clearance required. The motor valves do not lift in these two cylinders but are seated tight.

The Model A Ford motor has a displacement of 50 cubic inches per cylinder. With two cylinders compressing and driven at a speed of 1,000 rpm, the displacement is 58 cubic inches per minute, and at 1,500 rpm it is 87 cubic feet. The machine has ample power to compress up to 175 pounds pressure on two cylinders.

This self-contained compressor is mounted on a two-wheeled portable trailer to be pulled behind a car or truck. The standard Ford radiator, frame, cowl and switch, ammeter, starter button, choke, etc., are used with little change. The automatic control for the Smith motor-compressor consists of a motor governor to hold a constant speed from zero to maximum pressure, a pilot valve which opens and closes at predetermined maximum and minimum pressures, unloader cylinders controlled by the pilot valve, and an idling device for slowing the motor to the idling speed when the compressor is unloaded.

Oil Bath Type

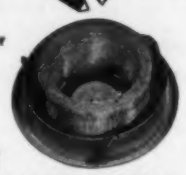
AIR-MAZE

AIR FILTERS FOR EVERY INDUSTRIAL PURPOSE

Look Inside

the air cleaners you are now using on trucks, air compressors and power driven road machinery. For once you see the inside of your present filters, you will know why we say look inside of a filter. Air-Maze is different from other filters in that it has an exact, uniform, density and does not clog up or cause any retarding restrictions. • A clogged air filter is a costly thing—it cuts down gasoline mileage as much as 20%. But Air-Maze doesn't work that way, and you can have an Air-Maze by simply specifying it whenever you order air compressors or engine powered equipment. Let us tell how Air-Maze will re-value your Air Filter experience.

Regularly used by
Ingersoll-Rand
Worthington
Gardner-Denver
Schramm
Davey
Okeh Clutch & Mach.
Quincy
and over 100 manufacturers



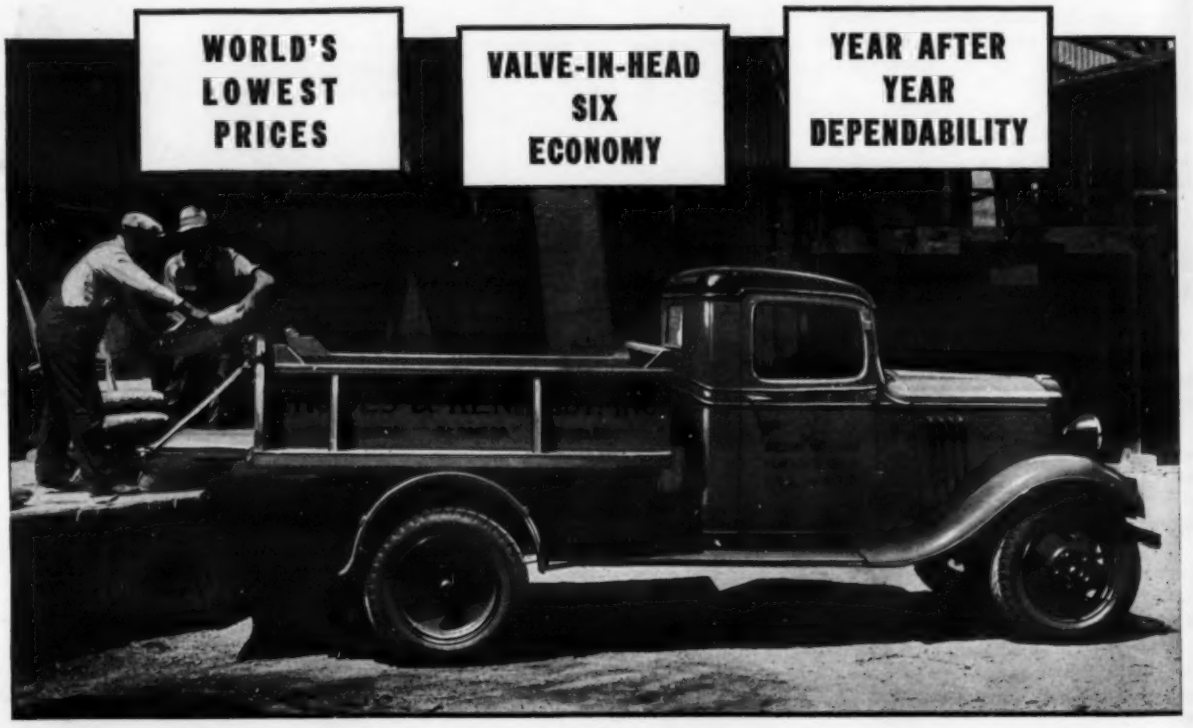
AIR-MAZE CORPORATION • 812 HURON ROAD, CLEVELAND, OHIO

IT PAYS 3 WAYS TO BUY CHEVROLETS

WORLD'S LOWEST PRICES

VALVE-IN-HEAD SIX ECONOMY

YEAR AFTER YEAR DEPENDABILITY



CHEVROLET Today, when every wise buyer of trucks is particularly interested in getting dependable transportation at lowest cost, the money-saving advantages of Chevrolet Trucks have a particularly strong appeal. Truck buyer after truck buyer is discovering that *it pays three ways to buy Chevrolets.* And truck buyer after truck buyer is deciding to take advantage of the big savings which Chevrolet offers. You, too, will get *better haulage service at lower cost* by buying a Chevrolet Truck because of these triple economies:

1. **Chevrolet Trucks sell at the world's lowest prices.**
2. **They use less gasoline and oil because they are powered by six-cylinder valve-in-head engines.**
3. **They give longer, more dependable service because of the *extra quality* which Chevrolet builds into every part of its products.**

Visit your nearest Chevrolet dealer—*this week.* Have a thorough demonstration of the right Chevrolet Truck for your haulage needs. Buy a *Chevrolet* and get better truck performance at the *world's lowest prices!*

CHEVROLET MOTOR COMPANY, DETROIT, MICHIGAN

Compare Chevrolet's low delivered prices and easy G.M.A.C. terms. A General Motors Value

CHEVROLET TRUCKS

THE ALL AMERICAN GOPHER LINE of Shovels

Every American Gopher Shovel is a star worthy of a place on the *All American Line* . . . a line that can take punishment and like it. Who picks the American Gopher Line? . . . the contractors and engineers who appreciate real performance "on the job."

Send for FREE copy of "American Gopher Shovels" Illustrated . . . action pictures of American Shovels "on the job."

AMERICAN HOIST & DERRICK CO.
Manufacturers of
CONTRACTOR'S, INDUSTRIAL AND RAILROAD EQUIPMENT
ST. PAUL, MINNESOTA

Breaking Down Cemented Gravel with Major Crawford's 20,000-Pound Fish Hook

Giant Steel Hook Breaks Hard Gravel

(Continued from page 6)

effectively as if it were a sandy loam. The two main members of the hook, which weighs over 20,000 pounds, were cut from single sheets of 1¼-inch steel, which form the beam and part of the 8-foot x 6-foot hook. The latter has two extra sheets of steel, the same thickness as those mentioned, riveted and welded in between the others, while the beam part is spaced by blocks of the same steel, riveted in and welded between the long members. In addition the corners of the beam are reinforced by 8 x 8 x ¾-inch angles, riveted and welded on. All edges of adjoining sheets are welded down. The beam is 40 inches wide at the rear and 24 inches wide at the front end. The entire fish-hook is 27 feet long.

Job Details

Considerable rock was encountered on the east end of the Andrade job, which required blasting. In this, holes were drilled from 10 to 12 feet deep, using Ingersoll-Rand jack hammers, with Timken removable bits on the steel, and two Ingersoll-Rand portable compressors. Groups of these holes were loaded with Atlas powder.

Major repairs for the contractors are made at the Andrade shops of The Imperial Valley Water District, but a machine shop has also been erected, for general repairs and maintenance of equipment, by the Callahan Company, at Colorado Siding, in California, near Winterhaven. The company's offices are also at Colorado Siding.

W. E. Callahan is President of the Callahan Company; Paul Grafe is Vice President; Major L. D. Crawford is Vice President and General Manager. Wm. McCormick is Secretary-Treasurer and V. H. Gray is Construction Superintendent. Herman Gunther and J. P. Shirley form the Gunther-Shirley Co.

Boyce & Igo Subcontract

Of the Callahan contract, 6,000,000 cubic yards was sublet to Boyce & Igo, of Baton Rouge, Louisiana. Starting at the same time as the Callahan Company, December 11, 1934, 164,000 cubic yards were excavated during that month near Araz, California, using a 10-W Bucyrus-Monighan dragline, with 12-yard dipper, and a 3-yard dragline of the same make and type. On May 1, the company had excavated approximately 2,200,000 cubic yards. With some rather extensive fills to be made on this contract it was found advisable to add a 10-foot extension on the boom, making it 175 feet long. Material was cast outside the ditch line, working first on one side and then on the other of the middle, as on the other contracts. The 3-yard machine was used in trimming and sloping, as well as in major excavation.

A dipper used on the 10-W, having been used in wet work before coming to Araz, had several rectangular holes in the back end to allow water to run out. It was necessary to plug these holes by welding in sections of plate. Sides of this bucket, where the pressure of the chains bear also have been reinforced with 24 x 36 x 1-inch plate on the outside, riveted with edges welded down, and the lip of the dipper was reinforced by heating a section of 1-inch plate with the acetylene torch and bending it around the corners, where it was welded in place. The V shaped bead on the front edge of this plate reaches a width of 2½ inches or more and a depth of about 1½ inches.

A Seventy-Five Caterpillar diesel with LeTourneau bulldozer is used in leveling operations and other heavy work, while a Caterpillar Thirty-Five and a Sixty are used for roustabout jobs and to service the machines. A Caterpillar Thirty is used to drive the Gardner-Denver compressor at the repair shop. Considerable repair work is done at this shop, and the draglines are assembled there. A Lincoln Stable-Arc welder is in use, as well as an acetylene unit. There is a Champion blower and other equipment.

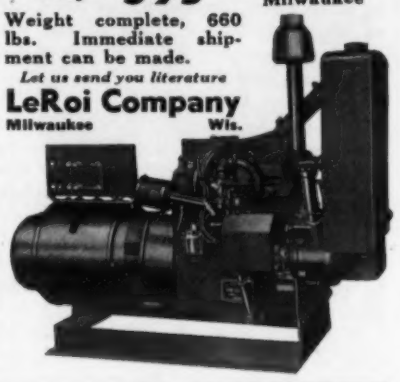
Work is carried on both day and night on the excavation, in 6-hour shifts. Roy L. Igo and Clarence Boyce comprise the Boyce-Igo Co.

Schedule 7

At Pilot Knob, near Andrade, the Griffith Co., of Los Angeles, was awarded a contract on Schedule 7, for $239,000, involving the excavation of 570,-

(Continued on page 34)

Light Up Your Job
—with this new, guaranteed 5 K.W. D. C. (5000 Watt) direct connected generating plant.
Only $395.00 F.O.B. Milwaukee
Weight complete, 660 lbs. Immediate shipment can be made.
Let us send you literature
LeRoi Company
Milwaukee Wis.

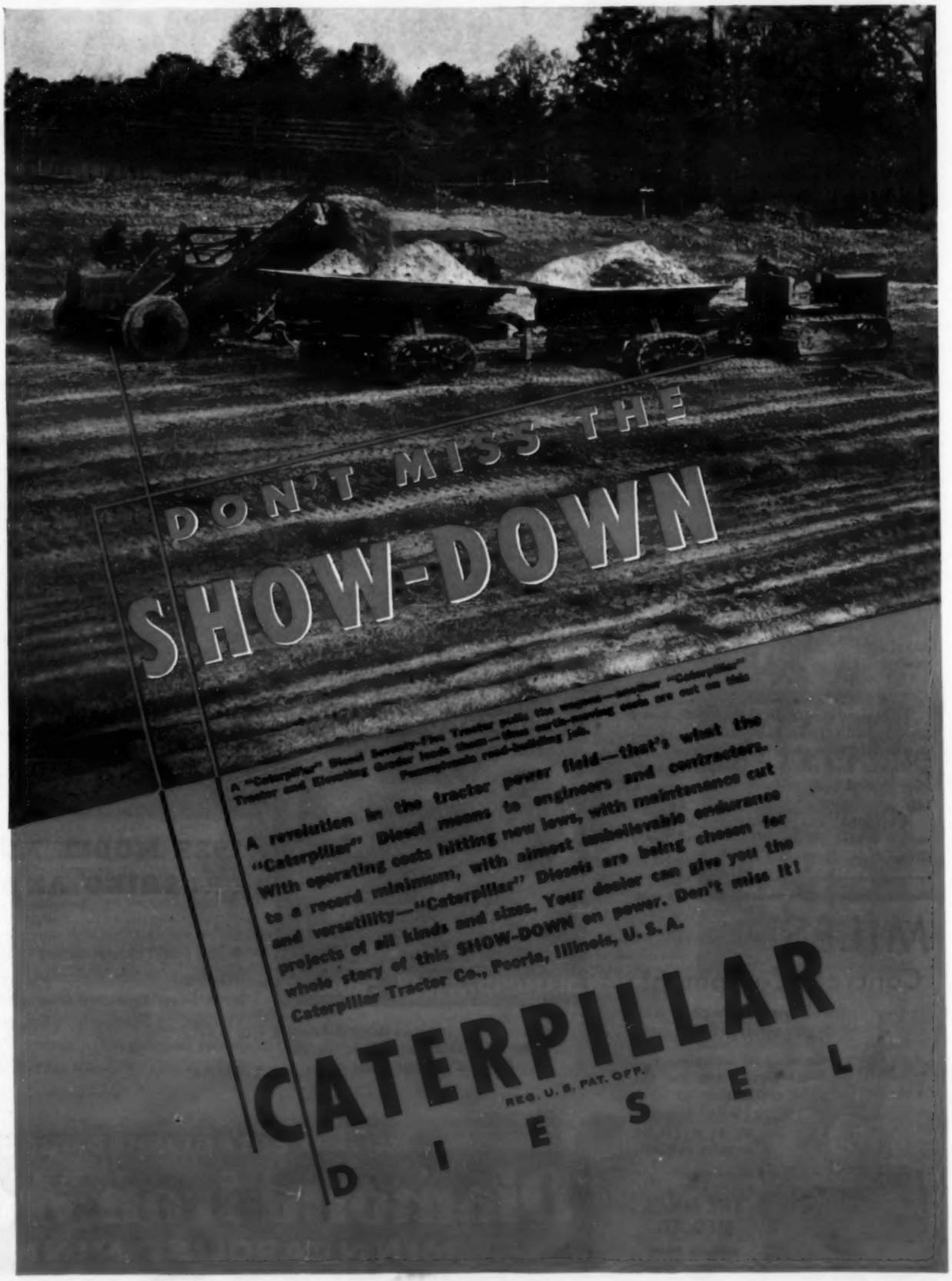


MAKE YOUR $$$ BUY VALUE—
and Value will make DOLLARS . . . for YOU

Lansing 10-S Concrete Mixer

Easy One-man control, Alemite lubrication, Hyatt roller bearings, rubber-tired wheels. Powered with LeRoi 12-hp. gasoline engine. Capacity: 10 cu. ft. mixed concrete per batch. Get complete data on this famous Lansing Mixer. Write—wire TODAY.

LANSING COMPANY
LANSING, MICHIGAN
Chicago New York Philadelphia Kansas City San Francisco Boston Minneapolis


DON'T MISS THE
SHOW-DOWN
A revolution in the tractor power field—that's what the "Caterpillar" Diesel means to engineers and contractors. With operating costs hitting new lows, with maintenance cut to a record minimum, with almost unbelievable endurance and versatility—"Caterpillar" Diesels are being chosen for projects of all kinds and sizes. Your dealer can give you the whole story of this SHOW-DOWN on power. Don't miss it!
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.
CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL

Peat Displacement for Highway Fills

(Continued from page 5)

ment across a deep peat swamp. This surface is left in place for from one to three years, depending on the depth of the peat deposit, kind of fill material, the completeness of the peat displacement, and the rate of settlement.

Conclusions

Peat that has been highly compressed and dewatered by the weight of a heavy fill is very difficult to displace. For this reason any method for complete peat displacement as the filling process progresses should be economical of both time and material. This should be particularly true in case of dynamiting or water jetting.

A careful study should be made of each swamp with respect to the character of the peat and the condition of the existing embankment.

At the present time, it seems that swamps up to 8 feet in depth should be excavated to bottom ahead of placing the backfill, that swamps ranging in depth from 8 to 25 feet should be treated by the partial excavation and surcharge method, and that swamps of greater depth than 25 feet should be jetted, provided that an adequate supply of water is available. There will be some overlapping in the use of the last two methods, depending on conditions encountered on each particular project.

It is not practical to attempt to draw diagrams to represent every condition encountered under actual construction. An attempt has been made, however, to illustrate the basic methods described, variations of which will provide for the common swamp problems. There are certainly opportunities for further improvement. In other words, the stage has not been reached in this study when a collection of standard procedures can be substituted for imagination, experience and a well-stocked knowledge of fundamentals.

Moving 10-B Shovels from Job to Job

A new trailer for carrying Bucyrus-Erie 10-B excavators from job to job over long or short distances fast and economically is now being offered to 10-B shovel owners by Bucyrus-Erie Co., of South Milwaukee, Wis.

This simple, practical and convenient trailer, with front-axle steering, dual-pneumatic tires, rear-wheel brakes, and a simple and effective loading system, gives speed and safety in 10-B transportation.

Additional information on this trailer may be secured by 10-B shovel users direct from Bucyrus-Erie Co.

Diesel Engine Power Units Have Self-Starting Device

A diesel power unit that can be started by cranking as readily as a gasoline engine of corresponding size through the use of a unique device which converts the engine into a conventional gasoline engine for starting has been developed by International Harvester Co. of America, Inc., 606 So. Michigan Ave., Chicago, Ill., in its McCormick-Deering diesel power unit. Setting a single control reduces the compression pressure and connects the high-tension magneto and gasoline carburetor with the combustion chambers. This starting arrangement eliminates the need for auxiliary engines or electric starters with heavy-duty batteries.

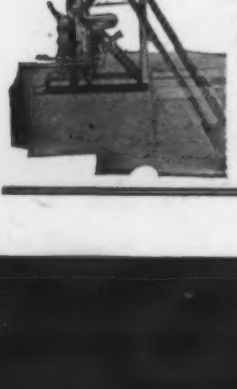
As soon as the engine has attained the proper speed, it is shifted automatically to diesel operation. This automatic shift restores the diesel compression, isolates the spark plugs from the combustion chamber and disengages the magneto and carburetor.

These four-cylinder diesel engines of 52 hp operating at 1,100 rpm run on low grade, low-cost fuels with a fuel consumption only a fraction, even by volume, of the gasoline and kerosene used in other internal combustion engines. The fuel injection pump is an independent unit mounted on the side of the engine block and is readily replaceable should the occasion demand, eliminating field adjustments on the pump. A complete description of these engines will be found in Circular A-299-W which may be secured direct from the manufacturer.

THE FAMOUS
GIANTGRIP T
STRAIGHTEDGE
Either Steel or Aluminum
Formed straight under tremendous pressure on tubemill presses, it STAYS straight.
Two usable edges:—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.
Write for circular
L & M
Manufacturing Company
Largest Exclusive Manufacturers of Paving Hand Tools
10302 BEREA ROAD, CLEVELAND, OHIO

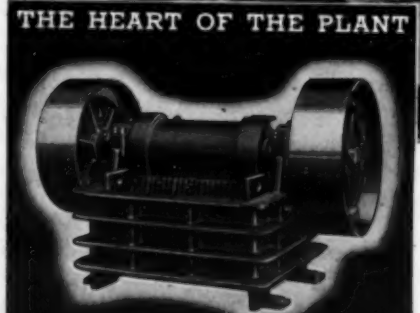
"The Strongest Geared Power for Its Weight in the World"—
BEEBE ALL-STEEL HAND HOIST
Capacity—5 tons straight line
Weight—110 pounds
Size—16x17x13" high
Two speeds—4 to 1; 24 to 1
Positive internal brake
Price $75. Write for list of dealers
BEEBE BROS.
2724 Sixth Ave., South
SEATTLE, WASH.

MILES
Concrete Equipment
for lower first cost and lower operating cost
Catalog of complete line of equipment for the production of concrete building units will be sent on request.
THE MILES MFG. CO.
Jackson, Mich.



Every Bearing a ROLLER BEARING

THE HEART OF THE PLANT



DIAMOND ROLLER BEARING CRUSHER
The well known Diamond Roller Bearing Crusher is standard equipment on all Diamond Portable Plants.
1935 MODEL NUMBER 65 PORTABLE CRUSHING AND SCREENING PLANT
● The latest improvement in Diamond Portable Crushing and Screening Plants is the elimination of all Plain or Babbitted Bearings which have been replaced throughout the machine with Roller Bearings. The No. 65 Plant uses a Roller Bearing Jaw Crusher and a secondary Roller Bearing Roll Crusher. For ample screening capacity, this Plant has a positive vibrator screen with 64 square feet of screening surface.
Write for illustrative folder describing these Plants
ESTABLISHED-1880
Diamond Iron Works, Inc.
MINNEAPOLIS, MINN. U.S.A.

Two Concrete Plants for Apalach. Bridge

(Photos on page 44)

Floating Mixing Plant and Unit for Hand-Rail Features of Equipment of Doullut & Ewin

FOLLOWING the completion of the long trestles of composite piles on the Apalachicola Bay Bridge contract, Doullut & Ewin were ready to pour the concrete deck of these sections and had previously completed the casting of six miles of hand-rail in their yard at Apalachicola. The simplicity of the floating mixing plant for the concrete deck and also the novel forms devised for pouring the deck are of interest, as is also the type of gang mold developed for casting the hand-rail.

The Floating Mixing Plant

A total of 10,992 cubic yards of Class AA concrete capable of resisting salt water, and 1,628,000 pounds of reinforcing steel for the deck were required as a part of this contract.

A barge 26 x 80 x 5-foot draft was used as the base for the mixing plant. On it were mounted three 3,800-gallon galvanized corrugated iron tanks for water storage. Immediately in front of the tanks was mounted on blocks a ½-yard portable Smith mixer as a standby unit in case the 1-yard Smith stationary mixer mounted at the front of the barge should breakdown during a pour. Over the 1-yard mixer was a 12-yard steel sand and gravel bin with suitable control to the weighing batchers suspended below. Water from the storage tanks was pumped by one of two Novo pumps mounted on the end of the barge, either of which could handle the full requirements for 25 cubic yards of concrete per hour. A portable conveyor mounted on the port side of the barge was used to carry bags of cement from the cement barge tied alongside to the platform of the mixer.

When in operation the sand and gravel barge, having a dividing partition to give about the proper proportions of sand and gravel for the mixer, was tied alongside. The barge measured 30 x 100 x 7-foot draft. The derrick barge, 30 x 80 x 5-foot draft, was of steel and mounted a 25-ton American Revolver with an 85-foot boom and carrying a 60-hp boiler. This crane could reach to the sand and gravel barge aft and charge the aggregate hoppers, and also swing around and handle the two 1-yard bottom-dump concrete buckets which were used for pouring the deck.

Deck Forms and Lifting Cranes

Because of the inventive genius of J. P. Ewin, a set of steel forms with wood tops was devised to handle the entire form problem with units that fitted the bridge deck without any extra work on the trestles except the insertion of wedges under the curb line to give camber so that the deflection of the I-beams under the weight of the concrete as poured would be corrected in the final horizontal alignment of the curb. It will be recalled from previous articles in this series that the roadway is 24 feet between curbs and the reinforced slab 8 inches thick with a curb 9 inches high and 16 inches wide carrying the hand-rail posts which measured 10 x 12 inches, and 10 x 18 inches at expansion joints. These posts were cast in place on the curb with special steel forms designed especially for this contract.

The deck forms were so made that an overhead crane, described below, could lift the forms for one complete 25-foot section at one operation. The foundation of a single deck form unit was a pair of transverse channels 8 inches deep and 32 feet 4 inches long with eye bolts in the ends for the cable from the lifting cranes. At mid span two 6-inch channels 30 feet 9 inches long, also running transversely, acted as a stiffener. Running longitudinally of the bridge structure were six pairs of 6-inch channels with the flanges turned away from the stringer I-beams of the bridge so as to act as forms for the sides of concrete encasing the I-beam stringers. These channels had vertical angles riveted to them, carrying cross angles about 12 inches above the channels. These cross angles carried the wood deck of the forms made up of 8 x ⅞-inch tongue and groove timber dressed on both sides. The wood forms were held together by several cleats in their length and also with angle iron braces.

In order to permit stripping without pulling the forms to pieces, the plank top form was held to the transverse top angles by a series of stirrups which came into play only after the structural steel frame had been lowered about an

(Continued on page 32)

SAUERMAN
LONG RANGE MACHINES

for Digging in the Dry or Under Water

Reach as far as 1500 ft.

Dig Deep; Dump High.

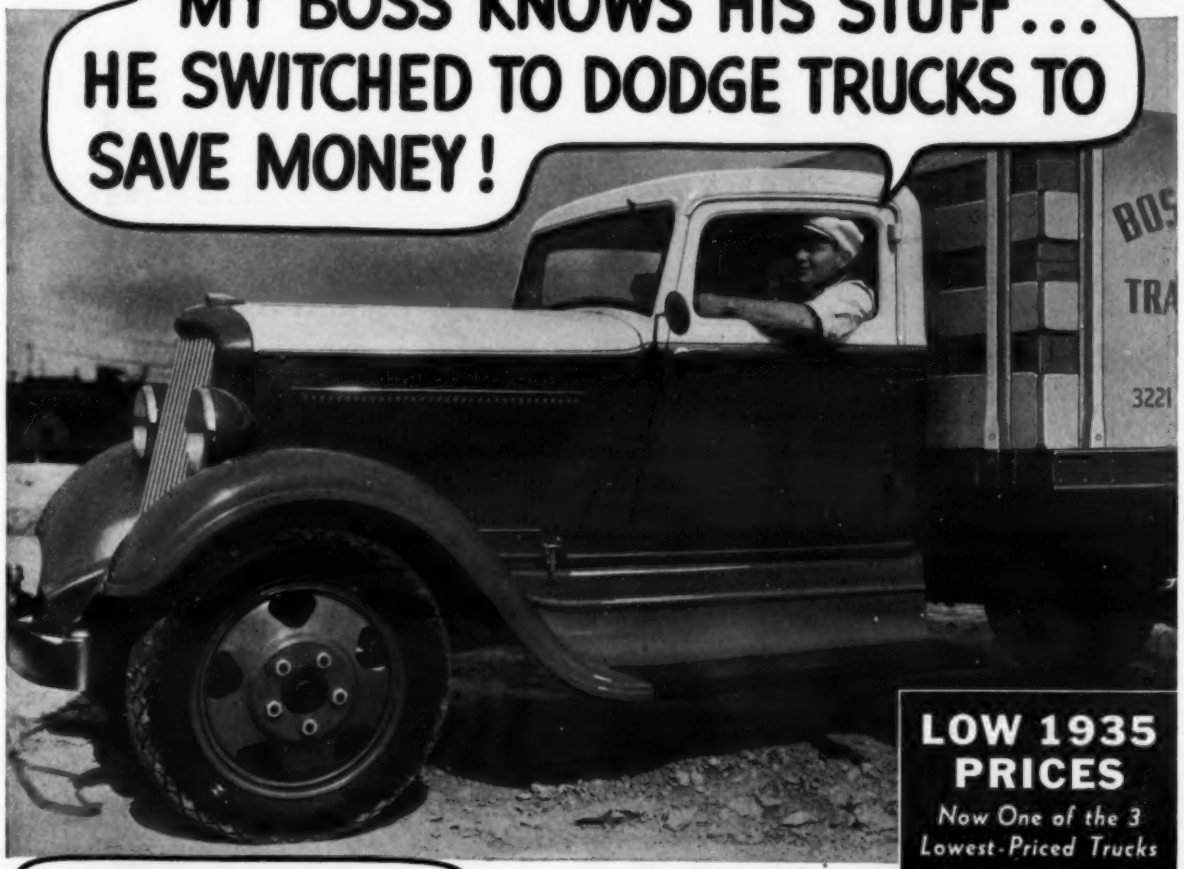
Capacities from 100 to 5,000 cu. yd. a day.

Low in Cost

Write for Catalog.

SAUERMAN BROS., Inc.
464 S. Clinton St.
CHICAGO . . . .

MY BOSS KNOWS HIS STUFF... HE SWITCHED TO DODGE TRUCKS TO SAVE MONEY!



*Dodge 1½-ton Stake, 137" w. b.—$680**

HYDRAULIC BRAKES SAVE MONEY!

It's hard to believe . . . but true . . . your most limited truck budget will now buy a Dodge! Dodge is famous everywhere for quality . . . dependability. Yet Dodge extra-quality trucks today are priced right down with the other two lowest-priced trucks. And look at the extra money-saving features Dodge gives you . . . many features like those you find on only highest-priced trucks!

Dodge gives you genuine hydraulic brakes . . . stay equalized . . . stop quick and safe, without swerving . . . save you money on tires, brake linings and adjusting expense.

FULL-FLOATING REAR AXLE SAVES MONEY

Pioneered by Dodge in low-priced trucks to save upkeep expense. Check Dodge against the other two lowest-priced trucks and you will quickly see which one has the best rear end!

VALVE SEAT INSERTS SAVE MONEY

Another feature that Dodge pioneered. Make valves seat better . . . save gas . . . postpone valve grinding for thousands of extra miles.

4 PISTON RINGS SAVE MONEY

Only Dodge of the three lowest-priced trucks gives you 4 piston rings . . . the others give you 3 . . . another Dodge advantage that saves both gas and oil.

LOW 1935 PRICES

Now One of the 3 Lowest-Priced Trucks

$365* ½-TON CHASSIS 111¼" w.b.—6-cyl.

$495* 1½-TON CHASSIS 137" w. b.—6-cyl.

GAS ECONOMY SAVES MONEY

Dodge alone of the three lowest-priced trucks gives you a simple, powerful 6-cylinder "L-Head" engine that assures maximum power . . . and is packed with many outstanding economy features. Users report these features give amazing gas savings in new 1935 Dodge trucks. See your Dodge dealer at once.

DODGE DIVISION—CHRYSLER MOTORS

**List prices at factory, Detroit, subject to change without notice. Special equipment, including dual wheels on 1½-ton models, extra. Time payments to fit your budget. Ask for the official Chrysler Motors Commercial Credit Plan. (Dodge Passenger Cars $645* and up.)*

DODGE COMMERCIAL EXPRESS—111¼" w. b.—6-cyl.—priced right down with the lowest—yet check it for high-priced, money-saving features! See your Dodge dealer $485*

2-TON CHASSIS & CAB—140" w. b.—7.00 x 20 duals and five speed transmission standard equipment (Body, hoist and special equipment extra.) $1010*

Dependable DODGE TRUCKS

TENTS TARPAULINS WINDBREAKS

The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY, and FULTEX Tarpaulins, Tents, Windbreaks.

Write our nearest plant today for catalog, samples and price list.

Fulton Bag & Cotton Mills

Manufacturers Since 1870

ATLANTA ST. LOUIS DALLAS

MINNEAPOLIS BROOKLYN NEW ORLEANS KANSAS CITY, KAN.

Welding a Big Factor at Grand Coulee

Welding operations, both in the shop and out on the job, are being carried out on a large scale by Mason-Walsh-Atkinson-Kier, contractors on the Grand Coulee Dam project. They employ over fifty welders, who use up an average of approximately 1,000 pounds of welding rod every week. The equipment is extensive, consisting of one P & H, one Westinghouse, one Lincoln and four General Electric 300-ampere gas-engine-driven arc welders. In addition, there are two Lincoln and three General Electric 300-ampere motor-driven units.

Practically every welding operation is done with arcs. Gas is used principally for cutting purposes. But even in that field, ninety Victor cutting torches were used at one time when the sheet steel piling of the cofferdam was being trimmed off.

There is a special welding shop in connection with the maintenance machine shop where work such as resurfacing bucket teeth and building up gears and pinions is done. Adjoining it is a welding yard where such heavy pieces as grizzlies are brought to be welded. Much of the work is, however, done out on the job with welding machines carried on special trucks.

When the sheet steel piling was being driven for the west side cofferdam, it ranged in length from 60 to 80 feet, driven to bed rock or refusal. When one of the piles would buckle seriously it would necessitate cutting out a section of several feet with a torch, bringing the two ends together again and welding them with the electric arc. This made it necessary to swing the men down the side of the cofferdam on staging and tackle.

After completion of the cofferdam, welding and patching rivet holes and welding three-way piling, so as to make tight joints all around, was in order,

Welding Rivet Holes in Cofferdam

accomplished in the same manner.

Welding is used largely in reclaiming the heavy gears and pinions on shovels and similar equipment. For shovel work, the worn pinions are built up with the welding torch to an accuracy of about 1/32 inch. This is sufficient for practical purposes and the pinions are put back without machining.

New Registration Law for Montana Contractors

The old contractors law came to an end on March 13, 1935, in Montana and is now superceded by a new Act which provides that all contractors who submit proposals to enter into a contract with the state, or any subdivision, for the construction of any public work exceeding $1,000 in value must be licensed. Applications require statements of experience and qualifications, and licenses are issued in three classes, Class A, without limitations, Class B, up to $50,000 limit and Class C, not in excess of $25,000. There is no license fee required for doing work valued at less than $1,000.

Licenses are renewable each year and must be secured from the Montana Board of Equalization with a 30-day period elapsing between the date of filing the application and the issuance of the license.

Watch

THE LINK-BELT WORK

The man who loves team play . . . the unison of an army on the march . . . will appreciate the perfect coordination of every individual part of the Link-Belt as it smoothly, quickly and easily forges through the toughest jobs . . . always living up to the Link-Belt reputation.

From ¾ to 3 yds. capacity, heavy-duty built. Gas engine, Diesel, or electric motor drive. All models can be shipped loaded on a flat car without dismantling.

STABILITY-POWER-SPEED

LINK-BELT
SHOVEL-CRANE-DRAGLINE

LINK-BELT COMPANY
300 W. Pershing Road
Chicago

Offices and Distributors in All Principal Cities

5058-C

New Imhoff Tanks at Rochester Plant

(Continued from page 2)

ing," made the traction much easier, and prevented wear on the planking of the runway.

The overhead runways were supported on columns of 4 x 6's placed 14 feet on centers and with outside joists of 2 x 12's. The inside joists for supporting the runway proper were 2 x 6's carrying 2-inch plank flooring. The bracing was 2 x 6-inch timber bolted and with cast bronze timber connectors to develop the full strength of the material. These connectors which went around the ⅝-inch bolts were 2 inches in diameter and ¼-inch thick with teeth on both sides to cut into the timber and hold it tight.

Handling the Concrete

With a maximum haul of 300 feet, using eight or ten of the two-wheeled concrete buggies, there were usually two men spotting the buggies where the concrete was being placed, two men grading the concrete, two vibrating and two screeding and finishing.

Several portable concrete vibrators made by the Viber Co. were used to "make the concrete walk." Tests made by the city of Rochester showed that there was an increase of 500 pounds on the seven-day tests in the strength of the concrete when vibrated. The vibrator itself was 2¼ inches in diameter and 12 to 14 inches long with 15 feet of flexible shaft with a rubber casing connecting to the electric motor.

Reinforcing Tank Center Walls

Inasmuch as one of the Imhoff tanks might be empty while its adjacent tank was full, the center walls carried heavy reinforcing. Seven 1¾-inch bars upset at the end for threads for turnbuckles were run both ways in the tank walls. As the bars were 35 to 40 feet long, placing them in the forms was not an easy matter.

Labor Organization and Hours

From the beginning of concreting about August 23, the contractor worked two 6-hour shifts but after October 1, because of light conditions and the fact that his crews were better organized, he worked two 5-hour shifts a day.

There were from fifty to sixty common laborers per shift, thirteen carpenters and about twenty steel workers. A labor crew of from eight to twelve men cared for stripping all the forms and the moving of the runways as concreting shifted to different sections of the long rectangular area.

Quantities and Unit Prices

Item No.	Item and Quantity	Unit Price
1.	Excavation in trenches and test pits including backfilling, 3,300 cubic yards	$ 1.00
2.	Unclassified excavation, 71,000 cubic yards	0.25
3.	Forming embankment, 36,000 cubic yards	.15
4.	Class A concrete including forms, 16,500 cubic yards	15.49
5.	Class B concrete including forms, 750 cubic yards	9.45
6.	Class B concrete without forms, 480 cubic yards	10.00
7.	Waterproofing concrete, 17,250 cubic yards	.34
8.	Waterproofing walls, 1,400 square yards	.30
9.	Steel reinforcing for concrete in place, 1,900,000 pounds	.03
10.	3-inch tile underdrains, 11,000 linear feet	.10
11.	3-inch vitrified tile pipe, 850 linear feet	.18
12.	3-inch vitrified tile 90 degree bends, 240, each	.47
13.	3-inch vitrified tile double tees, 120, each	1.16
14.	8-inch vitrified tile pipe, 1,700 linear feet	.45
15.	12-inch vitrified tile pipe, 2,400 linear feet	.90
16.	12-inch vitrified tile tees or Y's, 130, each	2.08
17.	Manholes with 8-inch walls, 120 linear feet	9.50
18.	Manholes with 12-inch walls, 35 linear feet	14.00
19.	Drop manhole complete, 1, each	412.00
20.	Receiving basins, 3, each	43.00
21.	Sand and gravel in sludge drying beds, 5,300 cubic yards	2.60
22.	New narrow gage track in place, 6,000 linear feet	.75
23.	Removing and relaying old narrow gage track 1,600 linear feet	.50
24.	Frogs complete in place, 50, each	14.40
25.	Switches complete in place, 50, each	20.00
26.	Furnishing cast iron bell and spigot pipe, 50 tons	48.70
27.	Furnishing cast iron bell and spigot specials, 5 tons	104.00
28.	Furnishing cast iron flange pipe and flange specials, 38.5 tons	145.00
29.	Furnishing special iron castings, 8.5 tons	160.00
30.	Setting cast iron pipe and specials, 102 tons	15.00
31.	8-inch circular sluice gates in place, 30, each	25.00
32.	30-inch x 30-inch rectangular sluice gates in place, 40, each	182.25
33.	Regulating gates complete in place, 10, each	700.00
34.	Iron hand rail in place, 1,200 linear feet	1.00
35.	Metal water stops in place, 100 pounds	.50
36.	Repair of old metal water stops, 20, each	10.00
37.	Removal and disposal of reinforced concrete masonry, 5 cubic yards	30.00
38.	Removal of trees and stumps, 25, each	5.00
39.	Treated timber and plank in place, 8 M.B.M.	110.00
40.	Timber in place, 2 M.B.M.	60.00
41.	Timber sheeting ordered left in place, 1 M.B.M.	60.00
42.	Setting 4-inch hydrants in place with drip, 12, each	10.00
43.	12-inch valves with floor stands complete in place, 10, each	70.00
44.	12-inch valves with wheel and chain complete in place, 2, each	72.00
45.	Bituminous macadam pavement, 150 square yards	2.00

Total bid—$473,400.40.
Engineer's Estimate—$538,058.00.

Personnel

The addition to the Irondequoit sewage treatment works was built under the direction of Morgan D. Hayes, City Engineer, and under the supervision of Thomas J. Morrison, Commissioner of Public Works, with H. L. Howe as Supervising Engineer on PWA projects and K. J. Knapp, Resident Engineer, all for the City of Rochester. For John B. Pike & Son, Inc., contractor for the project, the work was in charge of C. W. Blazer, General Manager, with J. A. Reed, Assistant Superintendent.

"Pony" CLAMPS

FOR CONCRETE

Making and Holding Forms for Posts, etc.

Pulling in Bulkos on Posts, Ceiling, etc.

For General Utility

Pony Fittings go on ordinary ¾" pipe . . . make clamps of any length. Instantly adjustable. Powerful. Strong. Patented stop zipps in position—grips at any point. Crank screw for tightening. Take place of helper on many jobs. Hundreds of small jobs keep them constantly in use.

Write for Circular

ADJUSTABLE CLAMP CO.
"The Clamp Folks"
427 N. Ashland Ave., CHICAGO

Stout fella!

This new ½ Yd. AMERICAN GOPHER SHOVEL

Send for FREE copy of "AMERICAN GOPHER SHOVELS" Illustrated Action pictures "on the job"

AMERICAN HOIST & DERRICK COMPANY
Manufacturers of
CONTRACTOR'S, INDUSTRIAL AND RAILROAD EQUIPMENT
ST. PAUL, MINNESOTA

OLD NEPTUNE, lashing his waters into fury and breeding his billions of destructive borers, holds no terrors for walls of Steel Sheet Piling. For marine structures—wharves, jetties, sea-walls and the like—steel sheet piling provides the strength, the permanence and the economy of Steel in the most convenient form. Many years of practical experience with all types of construction and the development of an extremely efficient range of piling sections give us confidence in our ability to serve you.

331

CARNEGIE STEEL COMPANY • PITTSBURGH
Steel Sheet Piling is also manufactured by ILLINOIS STEEL COMPANY • CHICAGO
United States Steel Corporation Subsidiaries

Penetration Project on Top-Soil Base

(Continued from page 12)

tor three men hand-broomed the entire length of the application of the tar, pushing any excess to the edges. One man with a hand pouring pot touched up any spots that did not take the prime. The prime penetrated from ¼ to ½-inch into the top-soil base. No traffic was permitted on the prime and as soon as it dried the first application of asphalt could be made.

Applying the Asphalt Binder

Standard Oil Co. of N. J. asphalt with a penetration of 150 to 200 was received in insulated tank cars at the same pick-up points as were used for the tar prime. The shipping point was Charleston, S. C. When spotted on the spur at the job the cars were heated to about 300 degrees with a booster heater consisting of a wood-burning boiler and then the temperature was raised in the distribu tor to 325 to 350 before application. The asphalt binder was applied at the rate of 0.4 to 0.45 gallon per square yard.

First Stone Spread Immediately and Rolled

The specifications required that the first stone on the asphalt binder be spread immediately and rolled within 30 minutes after the binder was on the road. The stone was unloaded at Evans and Great Falls direct from hopper-bottom cars into small well-built wooden hoppers between a pair of ties directly over the boot of a Burch unloader which delivered the material to the trucks.

The coarse aggregate for the first course of stone was graded from 1¼ down to ¼-inch and was applied at the rate of 45 to 47 pounds per square yard by spreader boxes attached to the trucks hauling the material. A total of nine Hug and International trucks was used for hauling the stone.

The stone was immediately broomed and spotted by hand, using a gang of six men. They were followed by an 8-ton Buffalo-Springfield tandem roller which set the stone in the binder and primed base. Traffic was turned in on the road as soon as possible after the rolling was completed and allowed to use it for about 30 days with barricades to spread the travel equally over the entire surface.

Seal Applied in Two Shots

After traffic had compacted the new surface for 30 days, the loose material that had not been whipped to the edges by traffic was hand-broomed and a final sweeping with a rotary broom with steel bristles pulled by a truck was given to insure the removal of any loose stone as well as other objectionable material. Then a seal of a cut-back asphalt was applied at the rate of 0.15 gallon per square yard and immediately covered with fine stone varying in size from ½-inch down to 16-mesh screen size at the rate of 16 to 18 pounds per square yard. This was applied immediately after the application of the cut-back.

A second shot of seal of the same amount as the first was applied with the second distributor about 1,000 feet behind the first. After this application, the entire surface was hand-broomed and gang-broomed, then rolled with an 8-ton roller. The seal coats were allowed to dry or set for approximately three days and then the road was opened for regular traffic as completed.

Personnel

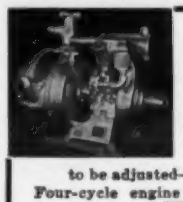
This 23-mile contract was awarded to the McDougald Construction Co. of Atlanta, Ga., for $243,346.88. E. O. Donaldson was General Superintendent and Turner Quillian, Superintendent on this contract for the company. Hood C. Worthy was Resident Engineer for the South Carolina Highway Department.

Fall Meeting of N. I. A. A. To Be Held in Pittsburgh

The convention of the National Industrial Advertising Association will be held at the William Penn Hotel, Pittsburgh, Pa., September 18, 19 and 20.

The program is the result of long and careful study by leaders in industrial advertising who have intimate knowledge of problems paralleling those of the average industrial firm. It is suggested by the Program Committee that executives of industrial firms, whether they support an advertising department or not, will be justified in sending a delegate to attend this convention.

Gregory H. Starbuck, of the Publicity Department of General Electric Co., is President of N. I. A. A.; R. Davison, of New Jersey Zinc Co., is First Vice President; J. R. Kearney of the J. R. Kearney Corp., is Second Vice President; William E. McFee of American Rolling Mill Co., is Third Vice President; and Allan Beach, Advertising Manager of Littleford Bros., is Secretary-Treasurer. D. Clinton Grove, Blaw-Knox Co., is President of the Industrial Advertising Council, the Pittsburgh Chapter of N. I. A. A., and A. E. Hohman, also of Blaw-Knox Co., is Secretary- Treasurer.



2" Self-Priming Centrifugal Pump

Easily carried by one man; 100% automatic
No handles or petcocks to be adjusted—weighs 98 pounds
Four-cycle engine with oil reservoir in crankcase
Easy to start—Speed control—Air cleaner
Foot and rope starters—self-oiling. Engine has only one place requiring lubrication.

Ask for Specification Sheet 20A

Marlow Pumps, Ridgewood, N.J.

AIR COMPRESSOR from FORD PARTS

With the patented Smith Compressor Head you can now build your own Motor-Compressor with 60-cubic feet capacity. Head is furnished with high-speed compressor valves over two cylinders, unloaders and complete instructions for mounting on your Model A or B Ford Motor. These Motor-Compressors are now being used in over twenty states for drilling rock, breaking pavement, riveting, sand blasting, painting, etc.

Write for full information and prices.

GORDON SMITH & COMPANY
Incorporated
1230 State St. Bowling Green, Ky.

The Koehring Wheel Dumptor
for hauling · dumping · spreading

70-5

A fleet of the new "20 mile per hour" Koehring Dumptors, hauling, dumping and spreading on a road re-location project. Speed in spotting, speed in loading, quick get-a-way and instantaneous dumping—fast dirt-moving operations at new low-cost figures. Three speeds, forward or reverse, permit quick return to the loading unit—without turning or backing, resulting in shuttle service to any fill location.

KOEHRING HEAVY DUTY

The Koehring Dumptor dumps the load *where you want it—right now.* The "tough" spots are as easily and quickly filled as "topping out"—without time-losing "jockeying" or auxiliary equipment.

20 MILES per HOUR

KOEHRING COMPANY
Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

Model Low-Cost Bridges

A 48-page brochure entitled, "Beautiful Low-Cost Bridges" has been published recently by the Armco Culvert Manufacturers Association, Middletown, Ohio. The purpose of this brochure is to show what has been done and what can be done using Armco Multi Plate pipe and arches. The brochure is illustrated throughout with large photographs and blue print designs of actual installations.

Another feature is a series of five perspective drawings of model Multi Plate bridges especially designed by F. E. Whitehouse, registered architect and engineer, Columbus, Ohio, with the actual delineations made by his assistant, J. E. Myers. In each case, the perspective drawing is accompanied by a detailed sketch, showing the elevation, plan and half-section views, according to scale.

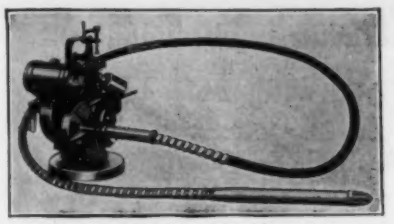
Since only a limited number of copies of this brochure are available, its distribution must necessarily be confined to engineers and others who are directly concerned with the design or purchase of large drainage structures.

Vibrator With 3-hp Engine Places Low-Slump Concrete

The Mall concrete vibrator with its 2-speed countershaft can be used either for vibrating low-slump concrete or for wet-rubbing concrete after the forms are stripped. It is equipped with a 3-hp gas engine and when the machine is used for concrete vibration, the V-belt is placed on the large engine pulley and on the small countershaft pulley. This furnishes vibrating speeds from 2,000 to 6,000 rpm.

For concrete rubbing, the V-belt is placed on the small engine pulley and on the large countershaft pulley which furnishes lower speeds best suited for this service.

The four 7-foot flexible shafts give a unit which makes it possible to reach almost every place where vibrating is necessary and still leaves the small 125-pound engine unit on a firm setting. The concrete vibrator is made with a 7-foot flexible shafting and is 2⅜ inches in diameter. Plunged into newly placed concrete, it quickly vibrates the mass so that it settles around reinforcings, resulting in a dense homogeneous mass without honeycomb. This unit is made by Mall Tool Co., 7740 South Chicago Ave., Chicago, Ill.

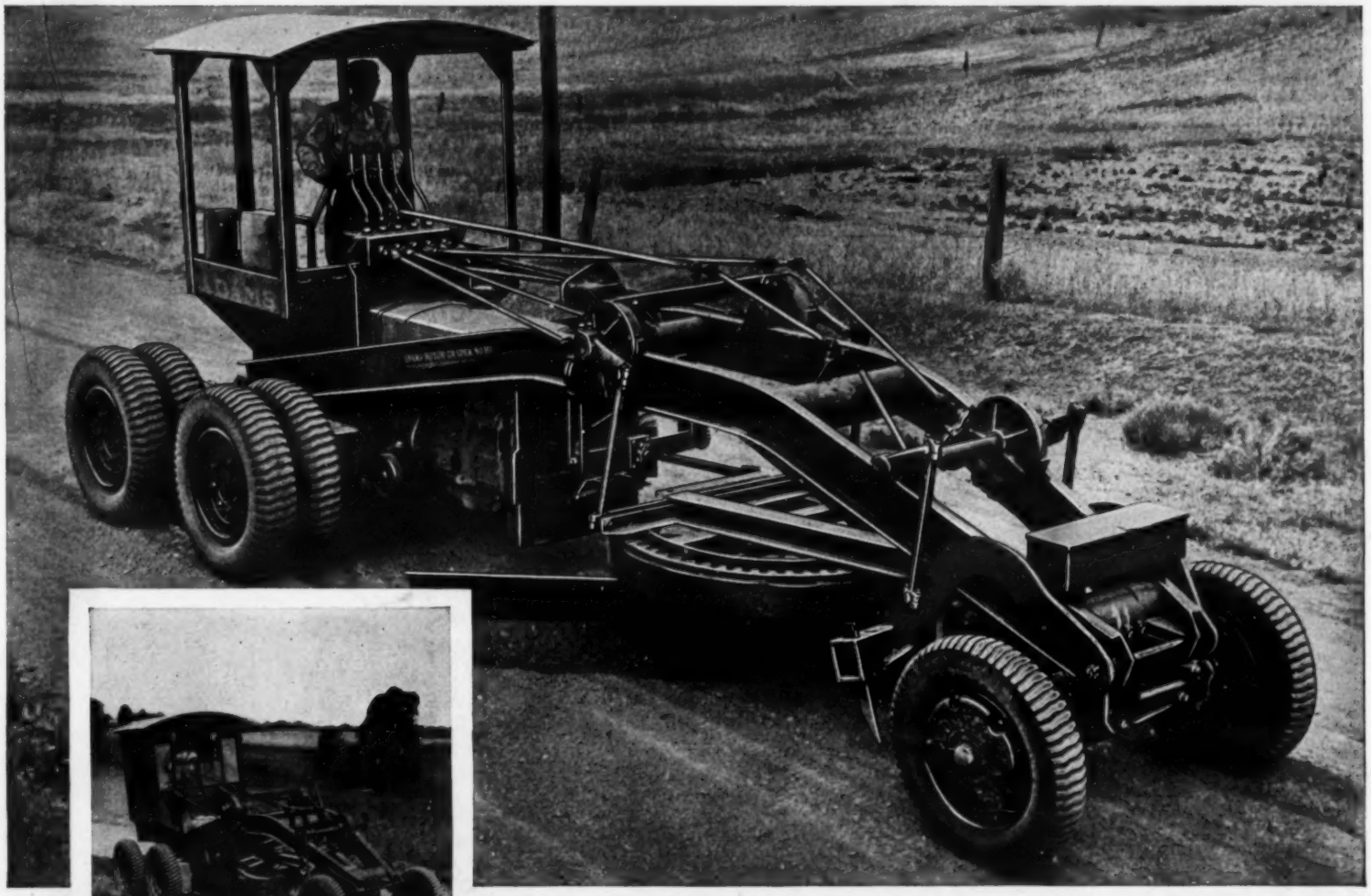


The Mall Vibrator on Its Full Swivel Base

A feature article on construction organization at Grand Coulee Dam will appear in our August issue.

POWER...STAMINA

AND A DRIVE TO SUIT YOUR NEEDS



WHETHER you are doing reconstruction, oil-mix, or maintenance work, Adams Motor Graders have the power, stamina and type of drive to suit your needs.

These machines are available with dual-tired, two-wheel drive, or Adams Tandem Drive (4 or 8 drive wheels) to provide the proper traction for the job. Where "soft" footing is apt to be encountered the Tandem Drive is recommended.

The Adams frame—a strong, solidly welded unit of distinctive design—provides unsurpassed strength and rigidity. Adams machine-finished construction, with adjustability for wear, assures a long, useful life.

Mail the coupon at the right for new motor grader catalog more completely describing these machines.

It may also be used to inquire about Adams Elevating Graders, Leaning Wheel Graders, Multiple-Blade Maintainers, Retread Pavers, Rotary Scrapers Dump Trailers, etc.

ADAMS

J. D. ADAMS CO., Indianapolis, Ind.

Minneapolis, Kansas City, Omaha, St. Louis, Memphis, Atlanta, Dallas, Spokane, San Francisco, Los Angeles

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Please send me your new Motor Grader Catalog.

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C&EM-735

ADAMS MOTOR GRADERS

Cement-Bound Macadam —Oregon Test Project

Methods and Costs of 2,651-Foot Project on Old Oregon Trail

TO test the possibilities of cement-bound macadam as a low-cost road the Oregon State Highway Department built a 2,651-foot section of 20-foot slab of 6 inches uniform thickness on the Dixie-Lime section of the old Oregon Trail in 1934.

Preparation of the subgrade consisted of smoothing and bringing to grade the entire roadbed section between stations. This was done with a motor grader equipped with a scarifier attachment, and hand labor.

Spreading Aggregate

The side forms were 3 x 6's, 16 feet long, surfaced on two sides and the ends. The expansion joints were made with 1 x 6's 20 feet long. Four stakes measuring 3 x 3 x 20 inches were used to each 16-foot form. On the full width roadway, the longitudinal joints were held in place with pavement pins which were removed after the section had been rolled. Transverse joints were placed by hand after rolling, the trench being shoveled out, the joints set, and the trench backfilled and tamped solid with a pavement tamper.

Transverse joints were spaced at 60, 90 and 120-foot intervals. Inspection after completion of the work showed that the joint spacing should not exceed 60 feet. Several methods were used in placing the longitudinal joints, the most satisfactory of which was to place the 1 x 4, used for the dummy joint, directly on the subgrade. This provided a 2-inch cover which produces only a hair crack which follows the joint.

That part of the work which was placed in 10-foot widths was built the same as full width, except that the edge of the first lane was used in place of the inner side form.

A 1¼ to 2¼-inch crushed rock, trucked approximately 8 miles in 4-yard trucks, was used for coarse aggregate. The rock was dumped, spread with a motor grader and rolled with a 10-ton roller. Low spots were filled in and rolled again. When necessary, low spots were filled a second time and tamped by hand. A 6-inch compacted depth of the ungrouted stone was thus obtained.

Grouting

A 1:2 grout was used for most of the work. It was delivered to the job by two truck mixers although three would have been the proper number to secure the proper speed of operation. The mixers were charged dry from an elevated platform, equipped with scales, where the sand was weighed. Water was added after the sand and cement.

The aggregate on the road was sprinkled immediately in advance of grouting as this aided penetration of the grout. The grout was discharged from the truck mixer by means of a spout and perforated distributor box. Excess grout on the surface was broomed ahead by laborers.

As only a 10-ton roller was available, it was used but found unsatisfactory in rolling the grouted stone. An I-beam tamper with plow handles at each end was substituted with excellent results. The tamper weighs 12 pounds per linear foot and was operated by two men.

Finishing

Two methods of finishing were used. On one part of the work a layer of mixed concrete approximately ½-inch was placed and finished. This was a 1:2:2 mix of cement, sand and ¼ to ½-inch rock. After tamping, the surface was broomed again, and the concrete mixture was dumped direct from the truck to the surface without the spout and distributing box. After it was spread, a screed was used to shape the surface. The surface was then floated with paddle floats, checked with a 10-foot straight-edge, the high spots removed with a bull-float, and burlap dragged over the surface to remove excess water and prepare it for the broom finish.

Two men were employed in leveling joints, truing edges and patching any small places that needed attention. These men also gave the final brooming, which gave a surface comparable to standard mixed concrete.

The second finishing method contemplated the laying of sheet asphalt over the tamped cement-bound macadam surface. Later it was decided to substitute an oil mat for the asphalt, because of the lower cost. It was believed that less care would be needed in bringing the concrete to a smooth finish, and that the oil mat could be applied more economically than the coarse cement grout to take out the resulting surface irregularities. Before the oil mat was applied, the riding properties of the cement-bound macadam base were tested and found to be satisfactory without the addition of a surface mat. With an inexperienced crew, the roughness obtained is estimated as about 75 vertical inches per mile.

Curing

Curing was maintained for approximately ten days with wet burlap kept in place for a minimum of 48 hours. On some of the work, the burlap was kept wet throughout the curing period. On other parts the ponding method was used, and on still others the surface was kept wet by watering with a hose.

Cost Data

The cost of this experimental cement-bound macadam base section, without oil mat surfacing, was 94 cents per square yard, or the equivalent of $9,930 per mile for an 18-foot pavement. The cost of a 6-inch cement-bound macadam surface with the ½-inch concrete finish was $12,500 per mile of 18-foot pavement.

Smoother

EXTRA YARDAGE AT LOWER COST

"L-O" LOWERS DIRT MOVING COSTS ON MICHIGAN HIGHWAY—MORE DIRT PER TRIP—MORE TRIPS PER HOUR THAN ANY OTHER TRACTOR

DIESEL FUEL

INJECTED WITH A DIESEL PUMP

IGNITED WITH A SPARK

Gives you:
EASIER STARTING
SMOOTHER OPERATION
LESS VIBRATION
FEWER REPAIRS

Responsive

This Model "L-O" Oil Tractor steps out faster on the Schwaderer job—"Where you want it, when you want it".

20,000-Pound Scraper

The "L-O" demonstrates its power by filling the scraper bowl with more dirt than competitive tractors.

Truck Speeds on Grades Studied by Highway Dept.

Studies of the speed of trucks and stages on various grades were made last May and July by the Washington State Department of Highways to determine the time lost by the average automobile driver due to the presence of slower moving vehicles on the grades.

The speed of each truck was obtained by following at a constant distance with an automobile whose speedometer had been calibrated. The observer noted speed and distance readings on the speedometer at every tenth mile or less. Notes were also made as to whether the vehicles crossed the center line of the pavement when on curves.

About 60 trucks and stages were checked on State Route No. 1 near Vancouver over a 5-mile course of concrete pavement with good alignment, where in each case a maximum plus grade follows a minus grade. On this road the truck drivers all took advantage of descending grades to increase the speed for a run at the ascending grades. In some cases, vehicles of over 40,000 pounds gross weight attained speeds over 40 miles an hour on descending grades over 5 per cent.

Other studies were made on a section of State Road No. 2 approaching the Snoqualmie Pass. The section was 4.77 miles long and a continuous ascent with grades ranging from 4.5 to 5.6 per cent. Forty trucks and four stages were observed on this road.

The third section was 1.32 miles long near Pioneer on State Road No. 1, where the grades range from 2.95 to 5.3 per cent. Thirty-two trucks and two stages were checked on this road.

The trucks were divided into classes according to gross weight with two special classes for stages and certified freight carriers.

After analysis of the truck speed figures together with those showing the total number of vehicles using the 154-mile section of the Pacific highway from Tacoma to Vancouver, the conclusion is reached that the slow-moving vehicles cause an annual time loss to motorists valued at $71,000.00 on this section of highway.

—From Highway Research Abstracts.

Per Cent Grade	10,000 Pounds and Under	10,000 to 20,000 Pounds	20,000 to 30,000 Pounds	30,000 to 40,000 Pounds	Over 40,000 Pounds	Stages	Certified Freight Carriers
			Average Minimum Speeds Observed on Ascending Grades in Miles Per Hour				
			Vancouver Section				
4.96	17.4	16.8	12.2	8.9	9.8	29.8	10.5
5.04	18.7	20.6	11.8	10.8		30.2	9.3
5.45	18.6	18.1	8.5	9.0	8.4	24.2	8.7
5.55	10.5	16.0	7.8	8.7	5.9	23.0	8.1
Average 5.25	16.3	17.88	10.08	9.35	8.03	26.8	9.15
			Snoqualmie Summit Section				
4.94	20.0	13.1	10.8	7.1	9.0	18.2	9.2
5.00	19.7	13.2	10.7	8.2	8.8	17.6	9.2
5.50	18.5	12.2	9.5	8.2	8.5	17.1	9.0
5.60	18.4	12.0	9.7	7.9	8.6	17.4	8.9
Average 5.26	19.15	12.63	10.18	7.85	8.72	17.58	9.08
			La Center to Pioneer				
4.98	18.2	14.6	12.8	10.6	9.8	19.5	11.0
5.08	17.8	13.0	12.8	9.6	9.8	17.0	10.4
Average 5.33	18.0	13.8	12.8	10.1	9.8	18.25	10.7

Special Safety Provisions on Mass. Fleet of Trucks

Twenty-three special provisions for safety are installed in each of the seventeen FWD trucks recently shipped from the Four Wheel Drive Auto Co.'s plant at Clintonville, Wis., to the Massachusetts Department of Public Works. These trucks, fifteen four-wheel drive 2½-ton trucks, and two 3½-ton trucks, are to be used by the Bay State for general hauling in highway construction and in snow removal.

Each of the fifteen Model HH6's is equipped with two-shoe, air-operated brakes on all four wheels. Buzzers, installed on the dash, automatically give warning whenever the air pressure in the air tank, which operates the brakes, is getting low.

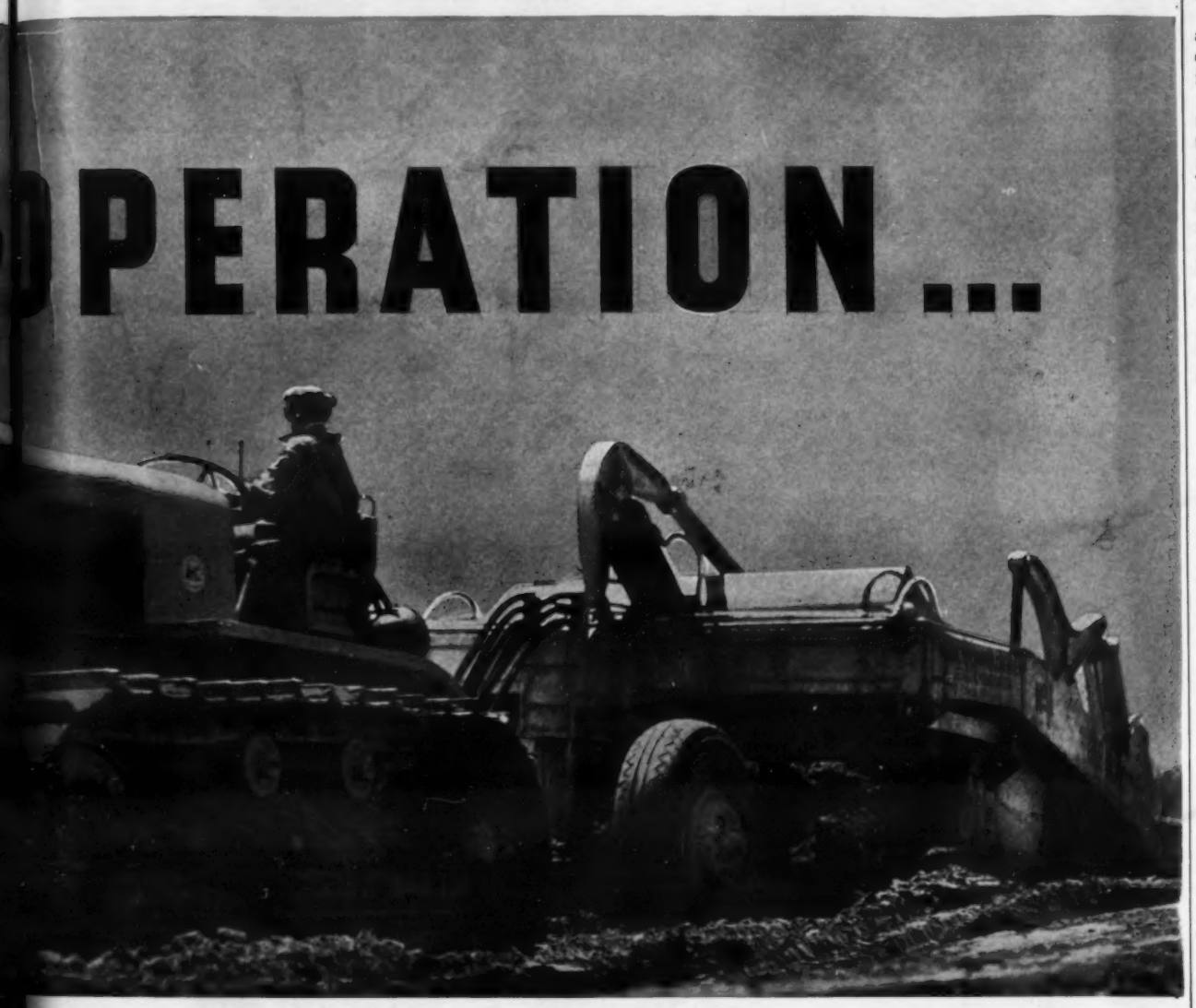
All the glass used in the trucks is shatterproof. The windshield is made sloping to increase clear vision and is equipped with two electric defrosters, each a supplement of the other. One-way windshield wipers that make a full sweep across the entire windshield assure full vision.

Other provisions include a ventilating fan in the cab, a built-in radiator shutter to help keep the radiator at even temperature; heat indicator on the dash; hot-water heaters in the cab. Seats are adjustable to three positions, so that the tall or short driver may drive as comfortably and safely as the average sized man.

Particular care has been given to the lighting. In addition to the regular system of lights, there is a combination stop and tail light mounted on the left-hand rear corner of the cab, near the top; a clearance light, 2 feet out on a bracket; three electric spot lights, operated from within the cab, and so located that light can be flooded in every direction, to give the truck full efficiency in lending assistance to wrecked or stalled cars at night. All wiring is encased in ½-inch flexible brass conduit and there are junction boxes at all branchings, making exposed wire ends impossible.

A special generator which develops 500 watts of electricity at any speed of the engine is part of the installation in each truck.

The two 3½-ton models have the same safety provisions and in addition, are equipped with air controlled steering gear, making manipulation positive and sure when the big trucks push snow plows through deep drifts.



THE vital advantage of low compression in a Diesel-fuel burning tractor is demonstrated on the E. B. Schwaderer job near Detroit. In competition with other makes, the Allis-Chalmers Model "L-O" handled a big 20,000-pound scraper to better advantage ... "got there" quicker ... filled the scraper bowl with more dirt ... delivered about three loads more per hour on the same average haul.

Why? Because of *smoother operation*. Allis-Chalmers Oil Tractors employ a new, improved system of engine operation which eliminates the need for high compression pressures. Diesel fuel is injected into the combustion chamber with a Diesel pump and ignited with a spark. High compressions are not necessary for ignition—compression pressures are only one-fourth to one-third those of the unimproved type.

Result—The Allis-Chalmers Oil Engine is not compelled to labor against high compression pressures. Operation is smoother. Less strain on working parts. Less vibration and wear. Fewer repairs. Claims can't compare with *facts* ... A-C Oil Tractors do the work at Lowest Final Cost.

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U. S. A.

A-C OIL TRACTORS
FOR LOWEST FINAL COST

The New Speeder Tractor Shovel

New Shovel-Crane-Dragline Mounted on Diesel Tractor

The new Speeder tractor shovel-crane-dragline, recently announced by the Speeder Machinery Corp., Cedar Rapids, Iowa, is mounted on a Caterpillar Diesel Forty, giving the unit the mobility of a tractor. It travels at speeds up to nearly 5 miles an hour under its own power and will negotiate grades, ditches and soft ground just as a tractor will.

Other features of this new Speeder unit are patented Speeder crowd for the shovel operation; anti-friction bearings; simple and extra heavy construction; and easy one-man operation. The shovel boom length is 14 feet and the dipper stick 11 feet. The crane and dragline booms are 22 feet long.

Flexible Vibrators Run by Air, AC or DC

Flexible vibrators are now used for compacting and placing concrete in walls, piers, buttresses and other locations, replacing hand tamping. Internal vibration of concrete insures the greatest density and permits the use of leaner mixes and dryer concrete. Viber Co., Ltd., 940 No. Orange Drive, Los Angeles, Calif., makes both electric and pneumatic-driven flexible vibrators.

The compact electric unit has a 1½-hp 110-volt AC or DC motor weighing 40 pounds, to which is attached a 12-foot flexible shaft of special design with sufficient flexibility to permit access to difficult spots. The vibrator is of double-tube construction. The vibrating tube itself is 2¾ inches in diameter and 18 inches long operating at a speed of 7,000 rpm. This unit insures high capacity for placing concrete without detriment to bond or forms.

The pneumatic vibrator has a rotor-type motor with a three-speed throttle which regulates the intensity of vibration. The flexible shaft and vibrator are of the same construction as for the electric unit. The speed of this vibrator is 9,000 rpm with an 80-pound pressure at the air motor. The total weight is 70 pounds. The electric vibrator is described in Bulletin No. 8 and the pneumatic vibrator in Bulletin No. 6, either or both of which may be secured direct from the manufacturer.

New 1¾ to 5-Ton Trucks Added to Hug Line

A new series of 1¾ to 5-ton Definite Purpose motor trucks has been added to its line by the Hug Co., Highland, Ill., manufacturer of the Hug Roadbuilder trucks.

In offering these new trucks, the Hug Co. adheres to its policy of having each model specifically built to meet a condition. Each commercial, dump and tractor model is designed and constructed especially for the work to which it is to be put. These new trucks are built in five series, 15, 19, 23, 42 and 43, with three models in each series: Model A for commercial hauling only; Model D for dump truck work and Model T for tractor hauling.

Features of these new trucks are a powerful six-cylinder truck engine, extra strong construction, steel channel bumper and two hooks, with body and chassis engineering and built as one integral unit. The Hug front-axle rocker action has also been incorporated in this series. This front-axle rocker action is said to give free, independent action to each front wheel and at the same time sturdy front axle construction.

Clarence E. Bement Dies; Long Vice Pres. of Novo

Clarence E. Bement, an outstanding figure in the industrial world and from 1907 to 1932 in active charge of the Novo Engine Co., as Vice President and General Manager, died on June 9 at his home in Lansing, Mich., at the age of 79. At the time he retired from activity he accepted the chairmanship of the Board of Directors which position he held at the time of his death.

Mr. Bement was an active figure in many national manufacturers' associations holding various offices. He also was elected to the office of President of the Michigan Manufacturers' Association.

TRY THIS HOBART WELDER
FOR 30 DAYS—AT OUR RISK

Learn why it's the fastest selling welder on the market today.

The Remote Control feature—at no extra cost, makes it a time saver and money maker on any job.

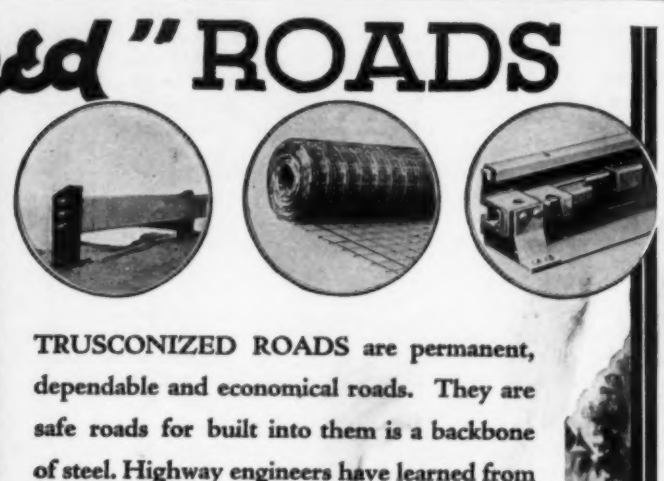
The new 40 Volt welding makes it the most practical welder for any job—none too large—none too small. Hobart is faster, costs less to operate.

Ask us for your copy of "The Many Profitable Uses of Simplified Arc Welding." No obligation, write us today.

of "SIMPLIFIED" ARC WELDING

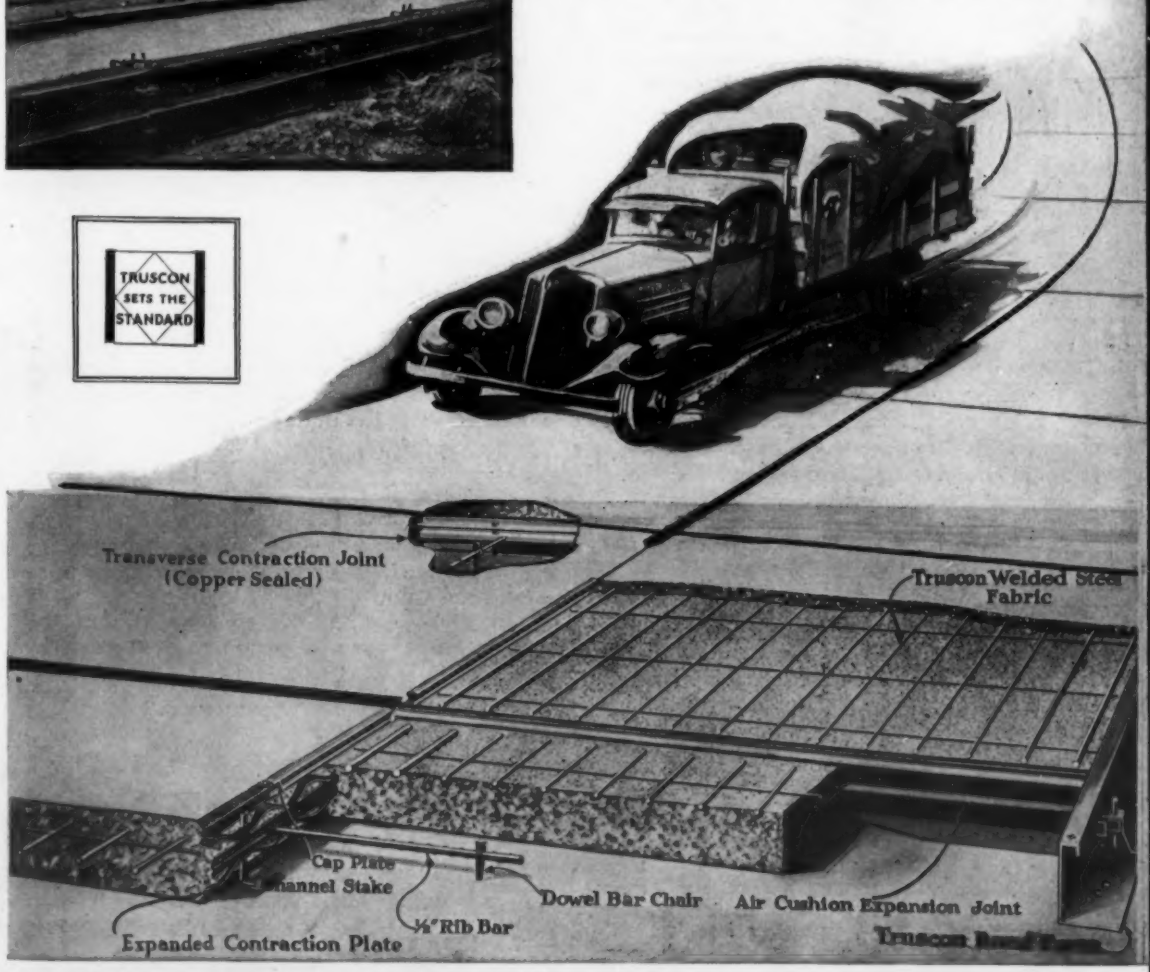
HOBART BROS.
Box CE-75. TROY, OHIO
One of the World's Largest Builders of Arc Welders

"Trusconized" ROADS



TRUSCONIZED ROADS are permanent, dependable and economical roads. They are safe roads for built into them is a backbone of steel. Highway engineers have learned from experience that it pays to "depend upon Truscon". Write today for full information and literature on all Truscon highway products.

TRUSCON SETS THE STANDARD



TRUSCON STEEL COMPANY • YOUNGSTOWN, OHIO

10S SPEED KING

2-Bag End Discharge Mixer discharges direct or with swinging spout, beats all records for mixing and placing concrete.

Get our low prices on Tilters and Non-Tilts.

THE JAEGER MACHINE CO., 701 Dublin Ave., Columbus, O.

Scooping a 5-Yard Load with a Continental Wagon Scraper

A 5-Yard Wagon Scraper

A full 5-yard capacity dirt-moving unit, handled readily by 35 and 40 crawler tractors and which is a one-man controlled outfit throughout, is made by the Continental Roll & Steel Foundry Co., 332 So. Michigan Ave., Chicago, Ill. The Continental Wagon Scraper is a combination scoop-up and carry scraper with all operations performed with only one handling of the dirt or other material. The material hauled can be deposited in any manner, windrowed or stockpiled or dumped backward just like a truck. All dirt is dumped to the rear of the machine, making it adaptable for backfilling against bridges, abutments or dumping over the end of a fill.

This machine scoops its own load or can be used in a fleet of dump wagons or motor trucks under an elevating grader, power shovel or dragline. Alloy steels are used throughout in its construction, the frame is a one-piece "dynamic steel" casting, the bucket, dirt-carrying extension apron and rear door are alloy plate and the machine is electrically welded throughout. It is mounted on two low-pressure pneumatic-tired wheels with high-grade roller bearings. All operations of the Wagon Scraper are controlled hydraulically by one lever convenient to the operator.

Record Made at Mono Tunnel

A new record for tunnel driving in rock has been established by construction crews of the Los Angeles Department of Water and Power on the Mono Basin Tunnel project with a 24-hour progress of 65 feet through the lava rock of Mono Craters.

Blasting and drilling in night and day shifts, hard rock miners have burrowed through more than 6,000 feet of the total 11-mile distance to be pierced. The tunnel is being driven from two headings at present. When shafts are sunk to the tunnel level, work will be pushed from six points.

Started in August, 1934, the long bore is expected to be completed in 1937 at a cost of $5,000,000. It will carry the combined flow of five Mono Basin streams into the existing Owens Valley water shed that provides the major portion of Los Angeles' water supply.

Four construction camps have been established to house the 600 men employed on the project.

Maintaining Roads in California

(Continued from page 2)

Retreads

Retreads of clean graded rock, sized to lock, are usually laid over established bases requiring smoothing rather more than protection. The thickness varies with conditions encountered, in general being limited to 2 inches. Where the thickness exceeds 1 inch, the road-mix method is employed, the binder used being the heavier road oils and asphalts, either hot, emulsified, or cut-back.

Repairs on this type are normally limited to surface ravellings, which are corrected by hand spraying the affected areas with oil and covering with stone chips. An effort is made in these operations to employ the same type and grading of materials as was used in the original construction.

The necessity for such repairs can be materially reduced by adequate surface sealing. This sealing is particularly desirable where the section is exposed to frost action. Non-skid or more open textures can be maintained without tight sealing where the base is waterproof and not exposed to frost action.

Pot holing may be repaired as outlined above or with a pre-mix grading using ¾-inch to dust material mixed with the SC-4 road oil. This pre-mix can be either manufactured on the ground or secured commercially. The SC-4 grade of oil has proved particularly suitable for stockpiling under marked temperature changes and extended periods of stockpiling.

It has now become standard practice to manufacture and stockpile this pre-mix along the roadside prior to entering the winter season. Excellent results have been secured, using local creek run gravels, after supplying such grading of fines as may be lacking.

Plant or Road Mixes

This type is constructed of a ¾-inch to dust crusher-run product, mixed either on the road or by plant with heavier slow-curing or medium- and rapid-curing asphalt. The particular type used is predicated on both traffic and climatic demands. Generally speaking, the medium- and rapid-curing products have a more general use. The type of failures encountered are similar to those experienced in the retreads and are repaired in much the same manner. Extensive surface disturbance is usually due to its permeability to water and requires scarifying, drying out, and relaying. Additional oil is not always necessary in this reworking. Since this type is usually laid over new sub-bases or on those permeable to water, their early sealing is desirable.

Maintenance Methods

The fundamental methods and technique of making repairs to bituminous surfaces are quite similar and vary only with the equipment used. In California, the trend is gradually toward the use of various gradings of pre-mix which insure uniform stability and performance with less delay than occurs under penetration methods. This does not mean that we can entirely dispense with our penetration equipment, which is admittedly more suitable for shallow surface repairs. Emulsions applied under pressure through hand sprays are replacing our hot oil kettles, resulting in less subsequent attention to winter patching.

This is the unit that

ETNYRE

built

to improve an already remarkable line of bituminous distributors

1. *A more compact assembly* of pump, valves and circulating system reduces the weight about 300 pounds, permits the unit to be mounted 4 inches lower on the truck without reducing the road clearance of the spray bars, makes insulation easier, and allows the valves to be readily heated from the motor exhaust.

2. *The new leakless valves* eliminate the drip-drip which has up till now been so annoying to operators.

3. *The new fifth-wheel-driven tachometer* is proving more accurate and satisfactory than either front-wheel or transmission drive. The fifth wheel is raised, when the truck is on the way to or from a job.

504—Write just this number—504, on a post-card, with your name and address, and we shall be glad to send you a copy of our Bulletin No. 504 which will give you further interesting facts concerning this new ETNYRE.

Etnyre

E. D. ETNYRE & CO.

DEALERS IN ALL PRINCIPAL CITIES

400 JEFFERSON ST., OREGON, ILL.

MODEL FO2

MANY A PROBLEM OF PROFIT IS REALLY A PROBLEM OF COSTS

THIS CONTRACTOR HAS FOUND THE ANSWER

SOMETIMES business men forget that PROFIT is what's left after all COSTS have been subtracted from all INCOME. Increasing net profit is not always a matter of getting more business. In many cases, it is a matter of lowering costs.

One way to lower costs is to gain the advantages of V-8 Economy in the operation of your business vehicles. With V-8 Economy, you save three ways . . . on first cost, on operating cost and on maintenance cost. And with V-8 Performance you can offer better service and attract new business too.

Your Ford dealer will be glad to let you make your own "on-the-job" test . . . with your own loads, over your own routes, with your own driver at the wheel. Call him today and ask for this test . . . and ask about the Ford Engine Exchange Plan and other parts exchange privileges that assure low maintenance costs.

THE FORD V·8 HYDRAULIC DUMP TRUCK

Capacity 1½ cubic yards. Load space measures 84 inches long, 66 inches wide, and the sides are 12⅝ inches high. Slots in the sides permit the addition of higher side sections. Available in either arm-lift or direct-lift types. Tail-gate can be swiveled from either the top or bottom. Hydraulic lift is controlled from inside the cab.

FORD V·8 TRUCKS AND COMMERCIAL CARS

Five-Hour Shifts on La. Levee

(Continued from page 10)

ket buckets. These are a fairly recent development in dragline buckets, the claim for them being that they are lighter, thereby offering more pay load per swing and also that the large openings permit the draining of wet material as it is dug and keep a lot of water out of the fill. It is also claimed that they will unload sticky muck quicker than buckets with solid construction.

Following Through with the Monighan

Building the upper section of the new levee was the job of the Bucyrus-Monighan with its 175-foot boom and 7½-yard Omaha dragline bucket. The walker handled material within a distance of about 400 feet of the levee section handling about 180,000 yards of material a month. It was equipped with a 300-hp Fairbanks-Morse power plant and worked the same shifts as the crawler outfit. Leschen cable was used for replacements on the Monighan.

For 8 hours of each day the Monighan placed material for dressing slopes and the remainder of the time simply mucked in. A crew of 12 to 18 men dressed the steeper riverside slopes during the 8 hours set aside for this work. The landside slope, being much less of a grade, was dressed with an Adams grader pulled by a Caterpillar tractor.

Lighting and Service Equipment

On all contracts which work day and night, as with levee projects, the lighting of the areas where excavation and dumping is under way is of the greatest importance. On the dump and for the area in which the greasing was done, and this was always just ahead of the dump, an Allis-Chalmers lighting plant of 15-kw capacity was set up in a well-built house with a floodlight mounted on top. Five other floodlights with 1,000 and 1,500-watt lights mounted on poles were placed at strategic points to make the area like day. The grease sled of the lubrication crew was carried along close to this lighting plant.

The Monighan had a 5-kw lighting plant mounted within its housing for floodlighting its work and this was supplemented on the levee by a General-Electric unit mounted on an old Ford chassis for portability.

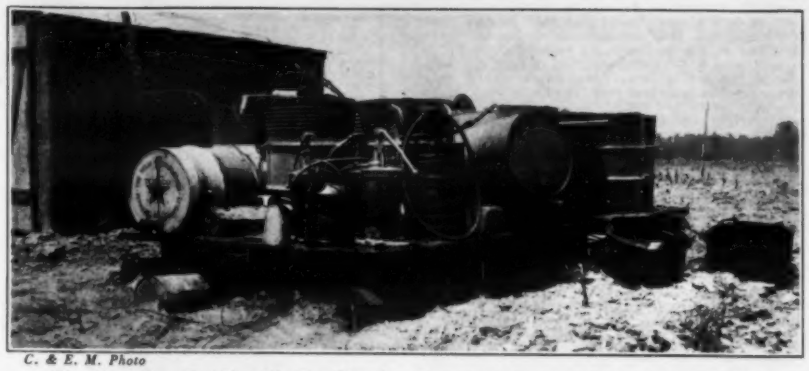
For the repair of buckets, booms and other work for which welding is particularly adapted a U.S.L. electric welder was maintained close to the machinist shops.

A master mechanic with complete equipment for overhauling the tractors, crawlers of both wagons and tractors, and any other machines was kept on the job throughout daylight hours, assisted by a crew of three mechanics and six or eight laborers. Only a skeleton crew was maintained at night for emergency work. The mechanic had a light service truck of early vintage which responded to the master's touch, or voice, but was shunned by all others as too uncertain transportation.

The machine shop was equipped with a 1½-kw Kohler electric plant for the operation of an electric grinder and a ⅝-inch drill. The remainder of the equipment was the standard outfit of hand tools necessary for the proper maintenance of any large fleet of machines working continuously on heavy construction.

Personnel

This contract of Harris, Brandenburg & Greeson of Baton Rouge, La., was under the personal direction of L. E. Harris with A. G. Johnson as Superintendent for the crawler outfit, and Earle Blecher as Superintendent for the Monighan, and Frederick Towl as Engineer of Construction. For the U.S. Engineer Office, 2nd New Orleans District, Lieut. Col. J. N. Hodges, District Engineer, the work was in charge of F. E. David, Junior Engineer, as Inspector.



C. & E. M. Photo

The Greasing Outfit with Its Alemite Guns and Drums of Grease and Oil

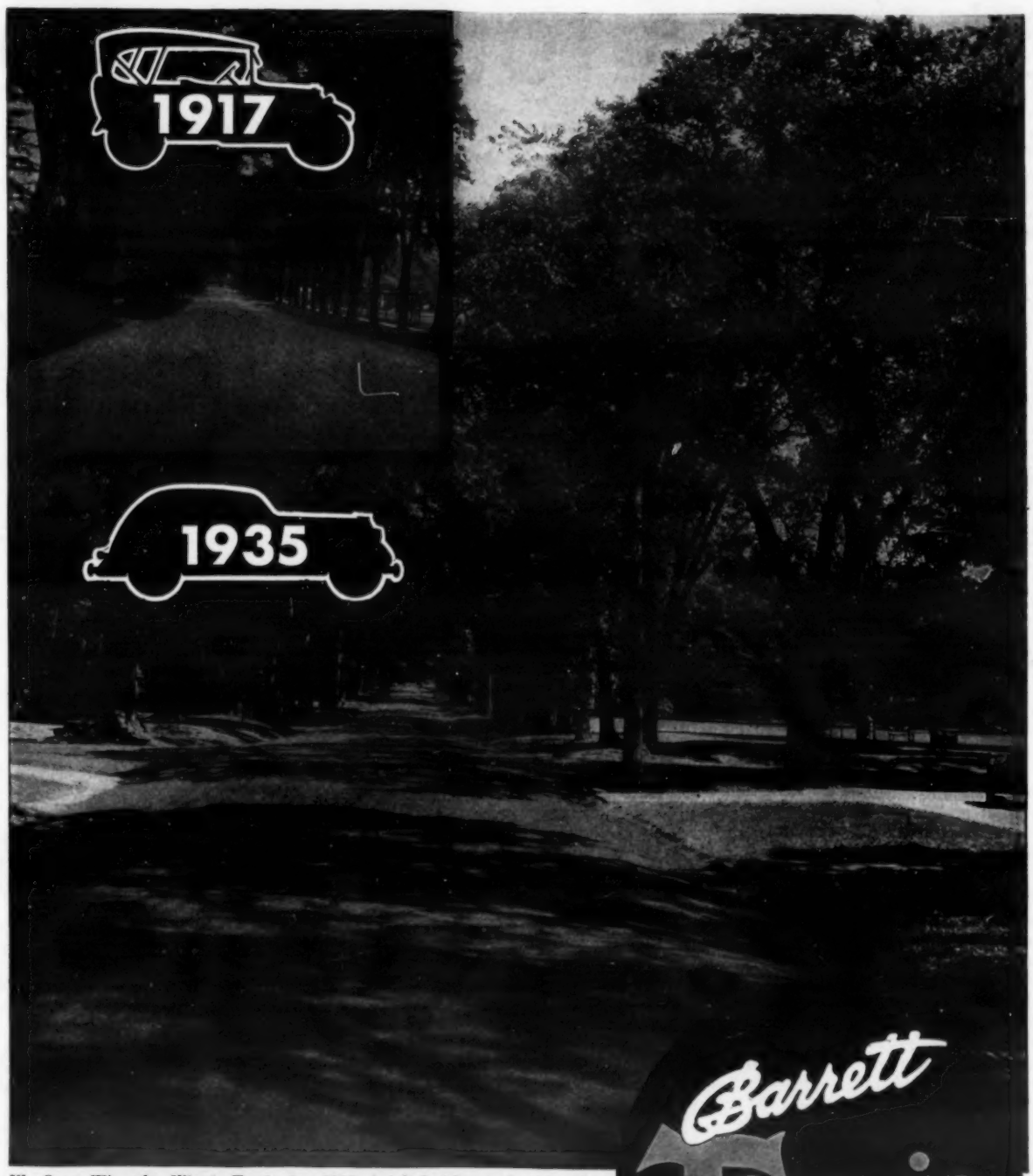
Holveck Joins Worthington As Special Sales Engineer

Worthington Pump & Machinery Corp., of Harrison, N. J., has announced the appointment of J. E. Holveck as Special Sales Engineer, operating from its Pittsburgh office but extending his activities also to the territories of the Cleveland, Detroit, Chicago and Buffalo offices.

Safety and Economy in Heavy Construction

"Safety and Economy in Heavy Construction" by Ray J. Reigeluth, Vice President, C. W. Blakeslee & Sons, Inc., of New Haven, Conn., grew out of superintendents' meetings in the author's own organization because it was discovered in the course of the meetings that there was a considerable lack of available information on this subject. In addition to suggestions for a safety organization and general safety rules, the book contains fifteen chapters on how to prevent accidents and reduce costs, which have proved their value on actual jobs.

This 237-page book, containing 47 illustrations, with flexible binding, is published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City: Price: $2.50.



Elm Street, Winnetka. Illinois, Tarvia since 1917. As it looked then, and as it is today.

No road-building, road-maintaining material has a better right than Tarvia to associate itself with the "Good Roads at Low Cost" idea. Hundreds of roads, which have been giving completely satisfactory service since they were Tarvia-built 15, 20 or more years ago, have been helping thrifty communities put the low-cost principle into practice. Ask the Tarvia field man about them.

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Lebanon Milwaukee Detroit Baltimore Columbus Youngstown Toledo Buffalo Providence Syracuse Hartford Cincinnati
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Truck Engine Trouble

Faulty Ignition System or Loss of Compression May Cause Failure of Truck Engines

By FREDERICK W. KOERBER

LAST MONTH there appeared in these pages suggestions for testing the fuel supply in case your truck engine fails. If that check proves that the fuel supply is not responsible for the trouble, then the ignition is the next logical cause to investigate.

A simple test, before deciding that the ignition is at fault, is to disconnect one of the spark plug wires and place it so that its end is about 3/16-inch away from the top of the cylinder or some other metal part of the engine. The wire must not touch any metal part however, and be careful not to have anyone touch it either, as they will undoubtedly sustain a severe shock if the ignition is O. K. Next turn the ignition switch on and crank the engine steadily for several seconds. If a bright spark jumps across the gap between the end of the spark plug wire and the metal, the ignition system can be considered to be in proper order. If no spark emanates from the spark plug wire, it will be best to try some of the other spark plug wires in the same manner. Should these fail to respond, it can safely be assumed that there is trouble in the ignition system. In this event, proceed with the following instructions:

1. Be sure that the ignition switch is turned on.
2. Look for broken connections of wire; also for loose connections, especially at the battery and distributor. Oil-soaked or cracked insulation will often short the circuit, causing trouble. Any defective wiring should be replaced and all connections tightened. A supply of extra wire should always be in the vehicle's tool box.
3. If the trouble has not been corrected, examine the spark plugs. These may be cracked. If so, they must be replaced. If dirty, remove, clean and see that points are adjusted to about the thickness of a thin dime, or better still, carry at all times a spark plug gage for use in setting points at proper opening.
4. To search further for the trouble, remove the distributor cap and, with ignition off, have someone slowly crank the engine. The contact points of the breaker arm should make a firm contact, then separate to thickness as designated by a contact gage, which is about that of a calling card. Points should be filed, for if pitted or dirty, proper contact can not be expected. If worn too badly, the contact points should be replaced. The ignition coil and the condenser should next be tested.
5. Dirt, oil or water may have short-circuited the ignition coil. Clean and dry. Examine unit for break in resistance wire.
6. It is also likely that the distributor cap is shortened by dirt. Remove the cap and clean inside and out with cloth and gasoline. Replace and watch for any broken distributor or spring. If missing, a new one must be provided. Often these fall down into the oil pan.
7. The trouble may be in a broken dashboard switch but this very rarely is the case. Loose wires at that point are often the cause of much trouble, however. Tighten all connections.

The above check, if carefully followed, can not fail to locate the ignition trouble, and its correction should be comparatively easy if the above instructions are adhered to.

Loss of Compression

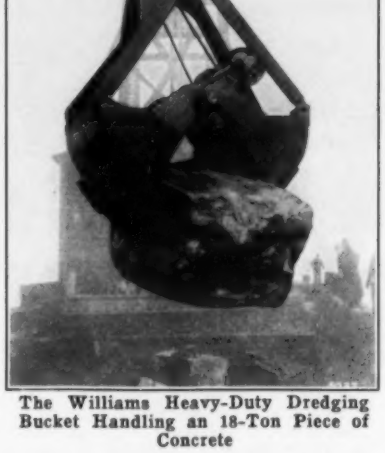
To ascertain the cause of loss of compression, it is most convenient to have the truck in your garage or shop, if you maintain one. To locate the defective cylinder, open all pet cocks and remove all spark plugs. Test the compression of each cylinder separately by closing its pet cock or inserting spark plug, then crank the engine by hand. When the cylinder that is losing compression is found (which will be evident by the fact that a defective cylinder offers little resistance to cranking), then examine the parts as follows, to determine the exact cause.

1. Make sure that the valve lifters are free when valves are closed, and adjust the clearance to the thickness of a lifter gage, while the engine is hot.
2. If the valves are pitted or carbonized, have them ground. Should they be warped, replace them.
3. If the valve stems are gummed or stuck, free with kerosene or denatured alcohol. If bent from removing, they should be replaced. Sometimes this difficulty can be removed by increasing the valve stem clearance slightly and by polishing the stem with emery cloth, especially in the case of new engines.
4. The cylinder head gasket may leak or be blown out. In this case, a new gasket must be installed and the head bolts securely and evenly tightened. The crankcase should be drained, as water would logically get into the oil under such a condition. The spark plugs should also be examined for water.
5. The valve spring may be either broken or weak. If flattened or broken, secure and fit new spring.
6. Defective spark plugs also may be the cause of the leakage. If this is the case, it can be readily identified by the hissing sound emanating therefrom. In such a case, it is most wise to replace the plug.
7. If the engine lacks compression on all cylinders when hot, the cause may be due to spent crankcase oil. Drain and refill.
8. If the engine smokes badly at the oil filler opening or at the breather this is an indication that the piston rings and the cylinders are worn. Have cylinders reground and new rings and pistons installed.

New Type of Clamshell Dredging Bucket

An entirely new type of heavy-duty clamshell dredging bucket was recently designed and built by the Wellman Engineering Co., 7012 Central Ave., Cleveland, Ohio, for handling heavy rock in the removal of breakwaters. This Williams bucket, which is of 3½-cubic yards capacity, weighs over 20,000 pounds.

It is constructed of welded alloy steel, normalized for grain structure, with heat-treated shafting, alloy-steel rivets and manganese steel teeth. The welded design utilizing alloy steel made possible its greatly increased strength with a minimum weight and produced a bucket structure which is claimed to have superior ductility and impact values. It is also estimated that the upkeep expense of this new bucket will be much less than in previous designs, due to the high physical values of the materials used in its construction.



The Williams Heavy-Duty Dredging Bucket Handling an 18-Ton Piece of Concrete

The illustration shows this bucket removing an 18-ton piece of concrete, almost twice the weight of the bucket itself, from 15 feet of water.

Smallest Power Shovel Starts Welfare Building

What is claimed to be the smallest working power shovel in the world, an exact half-size duplicate of the new P & H Bantam Weight, was used to break ground for the Employees' Welfare Building of the Harnischfeger Corp., at Milwaukee, Wis., recently in the presence of nearly 1,000 company workers, executives and guests. This midget shovel has a capacity of 3/16-yard and is powered by electricity. It served as a working model in the designing and building of the first Model 100 machines which are of ⅜-yard capacity.

LeTOURNEAU EQUIPMENT moves onto PIEDMONT DAM

● With LeTourneau Equipment—Buggies, Carryall Scrapers, Angledozers—come bigger yardages to Piedmont Dam, yardages such as these:

60 Yds. per Hour—3700-Foot Round Trip Haul. LeTourneau Buggies, loaded with over 30 loose yards of material, make a round trip haul of 3700 feet, a portion of it over a soft fill built across a swamp, every 21 minutes. Despite this heavy going 75 h.p. tractors travel right along with fully loaded Buggies over most of the haul in high gear, returning empty in high. Figuring but 21 pay yards to the load (a very conservative figure) each Buggy is delivering 60 yards an hour.

95 Yds. per Hour—1000-Foot Round Trip Haul. A LeTourneau 12 Yard Carryall Scraper, building roadway, and travelling over the same soft fill that the Buggies cross, makes a round trip of 1000 feet every 5 minutes, delivers approximately 95 yards an hour.

Yardages such as these are typical of LeTourneau performance the country over. That's why more and more contractors are turning to LeTourneau Equipment as a means of lowering costs, upping profits.

Your Problems Are Our Problems—Write our Engineers, describing your problems; they will gladly figure with you, tell you how LeTourneau Equipment is helping others on similar work.

● Easy to Spot and Load—The Buggy maneuvers into place easily and quickly; the wide body makes careful spotting of the shovel bucket unnecessary.

● Over 30 loose yards of Fill—A 75 h.p. tractor pulls it with ease—big pneumatic tires and heavy-duty Timken bearings make the LeTourneau Buggy an easy rolling, easy manipulating carrier.

● Below—All Out!—30 loose yards of earth completely unloaded, on the move, in half a minute—spreading too!

CONTRACTOR DESIGNED JOB PROVED

There's no "guesstimating" about the production of LeTourneau Equipment—it's tried equipment, designed by a contractor to whip his own tough jobs, proved on hundreds of projects from Portland, Maine, to the All-American Canal in Southern California.

● Below—Over a Spongy Fill with a full load—95 yards an hour placed on a 1000-foot round trip haul.

R. G. LeTOURNEAU, Inc.

PEORIA, ILLINOIS STOCKTON, CALIFORNIA

Cable address: "BOBLETORNO"

BULLDOZERS—SCRAPERS—ANGLEDOZERS—ROOTERS—BUGGIES

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Unseen Dynamite in Wording of Contract

"For every day that the owner delays the contractor in finishing the job, the contractor shall have a day beyond the contract time for completion. And the owner will compensate the contractor for any damage suffered through delaying progress payments." That in substance, although not exact wording, is how a California building contract read.

The question rises: Does the contract entitle the contractor to damages for being delayed in performance otherwise than through dilatory progress payments?

"No," answers the California Supreme Court in the case of Hansen v. Covell, 24 Pac. 2d, 772. "The obvious purpose of providing for the extension in the event of delays for the causes named is to prevent the operation of another clause in the contract which made the contractors liable to the owner at the rate of $25 per day for each day the completion of the building was delayed beyond the contract period."

Because the contract specified that the owner should pay damages for delays in making payments, there was an implied agreement that the only right the contractor had against other delays of the owner affecting performance was the right to an extension of time for completion equal to the period of delay caused by the owner.

Contractor Loses Novel Claim

A general contractor's employee was killed through negligence of a subcontractor. As a result, the general contractor was required to pay increased rates for further compensation insurance, amounting to more than $8,000 above the rates that would have been payable except for this accident experience. The general contractor then sued the sub to recover that amount, on the theory that, except for the sub's negligence, the accident would not have occurred and the insurance rates would not have been boosted.

In the case of Northern States Contracting Co. v. Oakes, 253 N. W. 371 the Minnesota Supreme Court dismissed the general contractor's claim, on the ground that the connection between the sub's negligence and the general contractor's insurance rates was too remote to warrant an assessment of damages. A different case would have been presented had the general contractor attempted to hold the sub liable, by way of reimbursement, for the amount required to be paid by the general contractor on account of death of the employee.

Principal's Failure to Sign Bond Did Not Release Sureties

Ever since Portia pulled those technicalities on Shylock to keep him from enforcing his bond against Antonio, it has been fashionable to try to grease the obligee's hold on a bond. But it is not every attack on a bond that is as successful as was Portia's.

In the case of Shade v. Anderson, 36 S. W. 2d, 1041, the Texas Court of Civil Appeals refused to release sureties on a building contractor's bond because the principal had omitted to sign the bond. It was decided that the contractor's delivery of the bond with intention to bind himself bound him, even though he did not sign; and that "the sureties could not escape liability merely on the ground that the bond was not signed by the principal."

Liability for Injury to Borrowed Equipment

The Kentucky Court of Appeals lately recognized a rule that has probably been declared by the courts of every state in the Union. The rule is that a borrower of a chattel is not liable for loss or injury to it, unless the loss or injury is due to his fault, or unless he has guaranteed a safe return of the property to the lender. (Bowman v. Vandiver, 47 S. W. 2d, 947.)

The court dealt with a case where the borrower of a road roller permitted the boiler to freeze, and where other equipment was damaged by collision with a truck. It was decided that proof by the owner of the machinery that it was in sound condition when lent and damaged when returned, placed the burden on the borrower to show that the damage did not result from his fault, or fault of his employees.

Contractor Had no Redress Against Taxpayers

A construction company did not have such vested interest in a village job, when taxpayers sued to enjoin awarding of the contract, as entitled the company to damages against the taxpayers when that suit was dismissed. That is a thumb-nail digest of what the Ohio Court of Appeals decided in the case of Pfaff Construction Co. v. Leonard, 178 N. E. 328. Sewer contracts were "awarded" to the company and had been signed by its officers, but not by the city's officials, when execution of the contract was temporarily enjoined by taxpayers. Later the injunction suit was found to be without merit and was dismissed.

It was then that the construction company sued the taxpayers for damages claimed to have resulted from the job having been held up. Its claim was disallowed by the courts on the ground that the mere award of the contracts, without their execution by the city, did not give the company any such vested right to the job as would support its claim.

THE Burch CHIP-IT-OVER is the machine you need for fast, accurate, low cost spreading of all materials from sand to 1 inch stone. Hooked to the rear of a truck in 30 seconds, it spreads material at any desired rate up to a yard a minute. Write for complete details.

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ROAD AND SHOULDER MAINTAINERS CRACK FILLERS
SPREADERS FOR STONE, ASPHALT, AND CHIPS
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ROAD AND STREET CASTINGS SECTIONAL CAST IRON PIPE
THE ROSS SNOW PLOW

for BETTER ROADS at LOWER COST

RAPIDMIX
PORTABLE ASPHALT PLANT

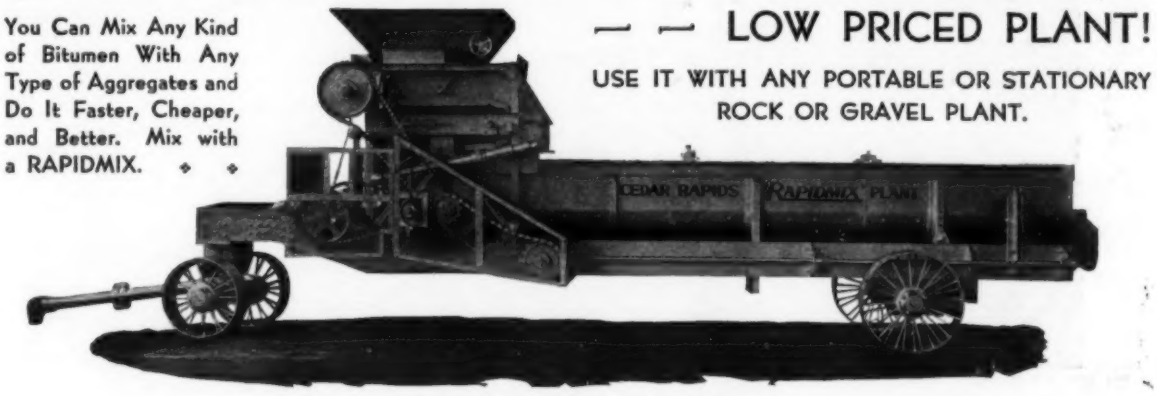
WHAT EVERY ROAD BUILDER HAS BEEN LOOKING FOR!

A FAST — ACCURATE — PORTABLE — LARGE CAPACITY

— — LOW PRICED PLANT!

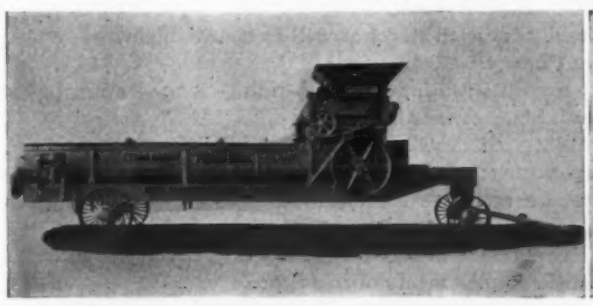
USE IT WITH ANY PORTABLE OR STATIONARY ROCK OR GRAVEL PLANT.

You Can Mix Any Kind of Bitumen With Any Type of Aggregates and Do It Faster, Cheaper, and Better. Mix with a RAPIDMIX.

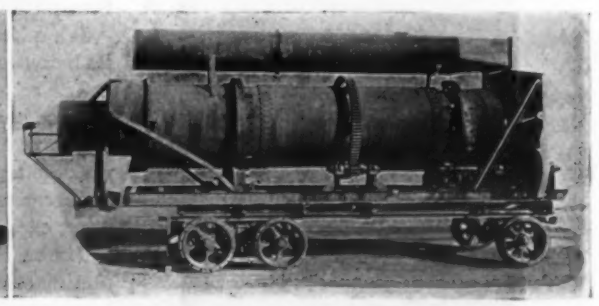


THE NEW CEDAR RAPIDS RAPIDMIX PLANT

Here is the New RAPIDMIX Plant that Enables Every Road Builder to Produce an Accurately Mixed Road Surfacing Material at a Very Low Cost. It has a capacity of from 75 to 100 tons per hour—weighs complete approximately 16,000 pounds—is equipped with an accurate aggregate batcher and Kinney meter pump—pugmill is 17 feet 4 inches long and is equipped with 76 mixing paddles with renewable tips—heavy ¼ in. manganese liner in pugmill—requires 60 to 80 H. P. to operate—you can use your tractor to operate it—use any type of bitumen—a LOW PRICED plant that will give you a better, cheaper and more satisfactory Black Top Road.



SIDE VIEW SHOWING DRIVES TO POWER PLANT



PORTABLE DRYER FOR USE WITH RAPIDMIX

IF YOU HAVE TO DRY YOUR AGGREGATES — USE THE RAPIDDRYER

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA

We also Build the Complete Line of Standard-Cedar Rapids Portable Paving Plants — 500 to 5000 lb. Capacities

—Weighs 40 pounds less than a good steel barrow—

THAT'S WHY IT SAVES YOU MONEY

The increased pay-load of this lightweight aluminum alloy wheel barrow allows increased earning power of 50c per day per barrow.

Note the pneumatic tire—this saves runway planking.

SHEET ALUMINUM CORPORATION
JACKSON MICHIGAN

Picks and Shovels

(Continued from page 1)

where the Central Engineering Co., of Davenport, Iowa, is building the dam after completing the lock last year. When he commented on the number of safety signs about the place, Art Cossens, the Superintendent, came back with the retort,

"There's going to be a lot more before we're through. We are going to run this job without any lost-time accidents if it can be done anywhere. There's a lot of rivalry among the river contractors this year to see who can run the safest job and we are going to show them!"

More power to Art Cossens and the Central Engineering Co. in the race for first place in this safety contest. And more power to all the other contractors working on the Mississippi River and elsewhere who have become safety-minded! This is one race where the happiest result would be all contestants tied for first place.

New Diesel Generator Set

Joint announcement has been made by the Harnischfeger Corp., of Milwaukee, Wis., and the Caterpillar Tractor Co., of Peoria, Ill., of a cooperative arrangement for building diesel-powered generator sets which will bear the name Harnischfeger-Caterpillar.

Offered in capacities ranging from 35 to 60 kw, these sets fill AC and DC current requirements for service in construction camps, outdoor lighting jobs and similar uses. The standard unit will include the engine with all auxiliaries, radiator cooling system, starting engine, auxiliary fuel pump, engine controls to provide proper speed setting and close governing, cooling between engine and generator, flywheel and coupling guard and the generator mounted on the unit base.

Inset in the picture above, the close-up view of the Stanolind Cut-Back Asphalt used shows clearly the non-skid nature of the surface obtained.

LET'S TAKE A CLOSE LOOK at this non-skid surface—after its first hard winter . . .

Sheridan Road in Evanston, Ill., is a good example of non-skid surface, paved with Stanolind Cut-Back Asphalt.

It's a heavily traveled street as well as a state highway, carrying the daily traffic between Chicago and the north.

The requirements are for a smooth-riding, long-wearing pavement with a safe surface in all kinds of weather.

The flexibility of Stanolind Cut-Back Asphalt construction specifications makes possible a pavement adequately meeting all of these requirements. In addition its appearance is a credit to the city. Resilience and noise absorbing qualities are other exclusive advantages of this type of pavement.

The results obtained are so satisfactory that the city of Evanston is now contemplating additional pavements of this type.

A representative from your local Standard Oil (Indiana) office is always ready to help you choose the most economical type of pavement to meet your particular specifications.

Coating mineral aggregate with Stanolind Cut-Back Asphalt during the construction of the above pavement late last fall. Contractors: Rock Road Construction Company.

Copr. 1935, Standard Oil Co.

ASPHALT *for every Purpose*

ASPHALT FOR PAVING . . .

Lubrication Queries

Is some lubrication problem bothering you? Tell us about it and we shall be glad to help you.

Question

What is the proper way to take care of ball and roller bearings on motors? —St. Louis, Mo.

Answer

The essential functions which a ball or roller bearing lubricant should perform are: 1. To protect the surfaces of the balls or rollers and races from rust or corrosion; 2. To assist in the exclusion of dirt and water by forming a supplementary seal; 3. To prevent friction between the balls or rollers and the retainer.

These requirements positively preclude the use of all lubricants containing acid, alkali, or sulphur, which, instead of protecting, would inevitably pit or etch and thus seriously injure the highly polished surfaces of the balls or rollers and races. Moreover, lubricants containing graphite are unqualified for ball or roller bearing use. The reason for this is that graphite is a solid substance which tends to accumulate in the races and obstruct the free rolling action of the balls or rollers. This tendency increases and eventually becomes a menace, as the lubricant in which the graphite is suspended is gradually lost. The proper lubricant for a ball or roller bearing on an intermittently-operated motor or generator is a pure neutral grease. This lubricant should also be capable of coating the balls or rollers continuously without "channeling." It should also remain plastic at quite low temperatures and still not lose its body to any great extent at high temperatures.

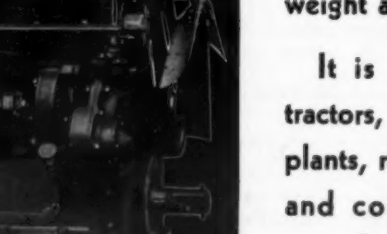
Where grease is used, the bearings are packed one-third full by the manufacturer of the motors or generators. The bearings should be inspected at sufficiently frequent intervals, four to six months, to insure maintaining this quantity of grease in them. When the housing is cleaned it should be flushed out with clean alcohol or gasoline to remove any hardened or dirty grease. After this has been done, be sure to flush out the housing with light engine oil before packing it with grease.

Should it be found necessary to clean bearings which have been removed, this can be done by immersing them in a solution of one handful of common washing soda to a pail of boiling water, then dipping in kerosene and moving them around by hand. After bringing them out, the bearings should be slowly turned and rocked until they spin easily, re-dipping in kerosene if necessary to remove all foreign matter and old lubricant. Blowing dry compressed air between the rings later will remove all loose dirt particles. Be sure the air is dry, however, and dip the bearing in light oil before it cools.

If a ball or roller bearing at any time shows an abnormal temperature rise, open up, examine the bearing to be sure it is in good condition and repack as outlined above. When grease is added under pressure leave the bottom plug out while filling. Then if grease starts to come out the hole for the bottom plug it indicates that the housing is too full. Too much grease in the housing is injurious. The housing should be preferably not over one-third full. If the grease level is higher than this, there is a tendency for the soft grease to churn and generate heat due to internal friction. This causes melting which further aggravates the churning and heating and causes the grease to leak out of the housing.

Western New York Dealer Wishes to Add New Lines

A western New York distributor of construction equipment wishes to line up new accounts in the following fields: bins, air compressors, hoists, concrete mixers, shovels and cranes, snow plows, tractors, and traffic signs. Letters addressed, "Western New York Dealer" in care of this magazine will be forwarded promptly to this company.



Oshkosh
Folding Barricade
Has adjustable jaw which takes any thickness of cross rail from 1" to 3"—no shimming—convenient extension swivel—handy flag socket—strong, light and compact—folds flat—competitively priced. *Write for Information*
LEACH COMPANY
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PILE HAMMERS
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Write for descriptive catalogs.
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Distributors in Principal Cities

CUT MOWING COSTS... with a

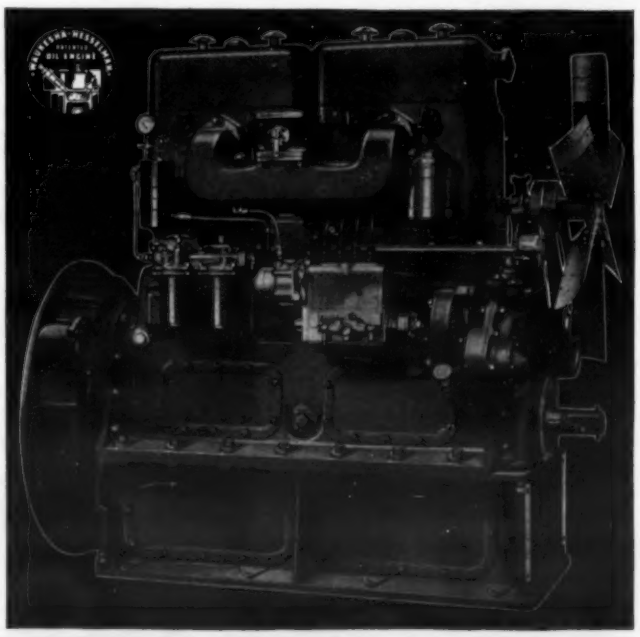
DETROIT MOTOR SCYTHE
- Here is the most economical and easily handled cutter on the market
- It goes anywhere, cuts anything, and enables one man to do the work of four or more with hand scythes.
- It has a 36-inch sickle driven by a powerful one-cylinder gasoline motor and is mounted on a free running 30-inch wheel, allowing it to be backed up, pivoted sharply, or tilted up or down slopes similar to a wheelbarrow.
- It is now produced by a recognized leader among mower manufacturers and during over four years of service, thousands of users have enthusiastically testified to its dependability.

Write for prices and Bulletin No. 3
DETROIT HARVESTER CO.
5450 W JEFFERSON AVE DETROIT MICH

Why you should specify "HESSELMAN"

The Waukesha-Hesselman is in no sense a semi-Diesel. No preliminary warming-up of hot bulbs or hot spots. It starts as easily, burns its fuel as cleanly, runs as smoothly as a gasoline engine . . . develops equal or greater power, and is moderate in first cost.

Since the Hesselman operates efficiently on standard furnace oils, Nos. 1, 2 and 3, kerosenes and distillates as well as commercial high speed Diesel fuels, its fuel cost is only about one-fourth that of gasoline.



THIS IS NO. 6 OF A SERIES on the Hesselman Oil Engine. A reprint of the complete series will be mailed on request.

The Hesselman is cool running. Its combustion chamber is formed by the concave piston head—a single casting with extra metal which conducts the heat from the head to the skirt. It is also fitted with wet sleeve cylinders and a full pressure oiling system.

The Hesselman is a low compression, solid injection, spark ignition engine, 20 hp. to 300 hp., both four and six cylinders, about the same size and weight as a gasoline engine.

It is recommended for industrial tractors, electric lighting and power plants, road building, logging, oil field and contractors' machinery, marine propulsion, etc. Write for Bulletin 1000. Waukesha Motor Company, Waukesha, Wisconsin.

WAUKESHA ENGINES

Concreting Plants for Florida Bridge

(Continued from page 17)

inch. Then its weight acted to strip the wood form from the concrete above.

The forms were floated out to place on barges and then lifted by steel frame travelers with pairs of Beebe hand hoists fore and aft, four to a traveler. There was one such traveler for lifting the forms and another for stripping. The travelers ran on the I-beam stringers of the bridge, with flanged rollers for the traveler to lift the form and flat rollers running partly on the concrete deck for the stripping.

The Hand-Rail Casting Yard

The concrete called for the placing of 31,312 feet, or nearly 6 miles, of hand-rail. This was all pre-cast in the contractor's yard at Apalachicola. The hand-rails measured 4 inches wide by 9 inches high and 7 feet 10 inches long. The upper and lower rails were of slightly different section, the upper rail being a T section, necessitating different gang molds for the two. Each rail carried four ⅝-inch round rods the full length for reinforcing.

The gang molds were simplicity itself. The basis of the mold was an extruded aluminum form of I-beam shape conforming to the side sections of the rails. These were set up on a bed of 2 x 6-inch planed timber with two 2 x 4's across the tops to space them properly by means of slots cut in the 2 x 4's. Across the ends the aluminum castings abutted simple timber facings tied at the ends by rods. The four reinforcing rods in each rail were spaced by the simple insertion of a piece of pipe held in place by a nail through the pipe and into the edge of the 2 x 4's across the top. These were removed as the forms were poured. There were 24 top rails and 24 bottom rails cast in one gang mold five days a week.

The concrete was mixed in a 7-S Koehring mixer at one end of the yard. Aggregate had been stockpiled close by in bins with wood floors and the batches were made up in wooden boxes on the frames of old wheelbarrows. These were weighed for accuracy on a Fairbanks platform scale set in the runway from the aggregate storage to the mixer skip. Two men handled the wheeling to the mixer and the mixer man dumped one bag of cement into each batch before raising the skip. One man with a wheelbarrow wheeled the batches away from the mixer along a plank run at the edge of the roof protecting the workers and the molds from sun and rain and he shoveled the concrete direct into the gang forms.

Four puddlers were used to insure the absence of honeycomb. The contractor, when estimating the job, had figured on using an electric vibrator for this work but it was delayed in reaching the job. The rails were stripped from the forms the morning after pouring, and immediately rubbed by hand and placed under water in a curing vat for three days and then taken out and covered with burlap and sprinkled for seven more days. An effective corps of six men per shift did the rubbing, which resulted in a smooth uniform hand-rail for the entire bridge. This crew was able to pour twenty-four upper and the same number of lower rails in a day with a 2-minute mix for all the concrete.

Water Supply and the Yard

Water for all operations requiring fresh water such as drinking, boiler feed, and concrete mixing was secured from a pair of wells driven to a depth of 85 feet in the contractor's yard. One was a 1¼-inch and the other a 2-inch

C. & E. M. Photo
The Mixing Barge Which Furnished Concrete for the Piers and Deck

pipe. A Novo pump was used on each of the wells and delivered to an overhead 2,000-gallon storage tank, with a 1,500-gallon supplementary storage tank taking the overflow from the first.

Adjacent to the water storage was a 12,000-gallon fuel oil storage tank for the fuel for the American locomotive crane which was the busybody of the yard and the American Revolver on one of the barges. The locomotive crane was used for every conceivable operation in material handling throughout the 16-hour day it was operated. A spur track was brought into the yard and served as the one connection with the outside world as far as materials was concerned. The crane was called upon to unload everything that could not readily be handled by one or two laborers.

Personnel

The contract for the driving of the trestle bents with the composite piles and the pouring of the concrete deck and the setting of the hand-rails was awarded to Doullut & Ewin, New Orleans, La., for $681,748.19. T. C. Bruns was Job Manager and Engineer and H. G. Byrd, Superintendent for the contractor. E. S. Fraser was Project Engineer for the State Road Department of Florida and W. S. Gudgell was Resident Engineer-Inspector for the Public Works Administration, Project 843.

Tight Cement Sewer Joints Used in Wet Trenches

A method of making up sewer pipe joints with cement even when the pipe may be practically half submerged in water has been used successfully on many projects. The largest is perhaps the 100-mile sewer pipe in sizes from 8 to 42-inch in Arlington County, Va., where all of the smaller sizes are being laid with the Weston joints made by L. A. Weston, Adams, Mass. On this project, strict infiltration tests are made of all lines before acceptance and reports of these tests have shown that infiltration has been much less than that allowed.

The Weston joint consists of a sheet metal form which is fastened to the lower half of the bell of the vitrified pipe before the spigot of the next length is entered. A sheet metal gasket is attached to the spigot of the adjoining length of the pipe, before it is entered into the bell. This gasket is used instead of jute and is so constructed that it automatically centers the spigot evenly in the bell.

After the spigot has been entered, the wire form is tightened around the pipe completely enclosing the lower half of the joint to a point slightly above the spring line. The form is then filled with 1:1 cement grout by means of a funnel shaped pump with a plunger. A hose of sufficient length is attached to the pump and is inserted in the form extending to the bottom of the joint. The grout is then pumped around the joint to the opposite side of the form and the pump is slowly withdrawn, with the pumping continued to complete the filling of the form. The upper portion of the joint is completed in the usual manner by hand, using a stiffer mixture of mortar.

This method permits sewer pipe joints to be made of cement, even though the pipe may be practically half submerged in water. It also allows the pipe to be backfilled before the joint is made, assuring that it will not be disturbed after being completed.

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INDUSTRIAL ENGINES

Road Maintenance By Preservation

By C. W. McCLAIN,
Engineer of Maintenance, Indiana State Highway Commission

MAINTENANCE operations are changing so constantly that it is difficult to say what is new, and quite often it is a misnomer to call them developments. The constant struggle of maintenance men to combat the ever-destructive forces of traffic, weather and the growing demands of the traveling public for uniform surfaces means constant vigilance and alertness.

One of the phases of highway maintenance is preservation, by which we mean the attempt to keep, as far as possible, the existing conditions on the highway as near intact as possible. Dragging of loose metal surfaces, cleaning ditches and drains, mowing weeds and cleaning roadsides, painting and cleaning structures and signs, pouring cracks and joints in hard surfaces, are some of the principal items in this part of the work.

Dragging Loose Metal Surfaces

The tendency in this operation is towards faster moving equipment which enables one operator to cover more miles in his working time, or a smaller mileage more often. Snow plows, underbody scrapers for surfaces and shoulders, and motor graders offer many developments. These are along the lines of easier and speedier control of the cutting blades, all tending toward one-man operation. Electric controls are supplementing or replacing hydraulic; multiple blades are partially replacing single blades, and diesel power is gaining much prominence.

Cleaning Ditches and Drains

Methods of doing this work have not developed along any new lines, but recognition of the importance of this class of work is increasing. It falls in the list of uninteresting details, which accounts for its tendency to be neglected. Clean, well-functioning side ditches have augmented the tendency towards side ditch paving. Many road paving and grading contracts now have ditch paving items included.

Mowing Weeds and Cleaning Roadsides

A few years ago weed mowing methods inclined towards power-drawn or self-propelled equipment. However, this type of work can be adapted readily for relief work, by furnishing mowers and hiring teams and men locally. Clean roadsides give travelers a degree of confidence which promotes safety, fixed objects which constitute real hazards are uncovered, and can be more easily avoided.

Care of Structures and Signs

Many good steel structures have been ruined in a few years by allowing debris to accumulate around the end posts. Maintenance crews should be instructed to keep bridge seats and the lower part of batter posts always clean and painted.

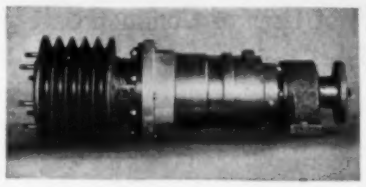
Signs, to be effective, should be quickly and easily legible. The use of steel signs in place of wood seems preferable and the change is going forward rapidly. Use of the proper grade of paint or enamel should be studied and good advice from reputable paint companies is easily available.

Pouring Cracks and Joints

Experiments are being run on the elimination of this class of work entirely but, until these experiments offer definite results, crack and joint filling should continue. Unfortunately the choice of proper filling is still in an embryo state.

Nation wide experiments on crack and joint fillers are being made and it is to be hoped that definite recommendations can be made in the near future. Mastic fillers of both tar and asphalt are being used with varying results. Mixtures of bituminous materials and either sawdust, cork and rubber have been tried. The problem is to find a material that will alternately compress and expand and still cling to the sides of the joint. Spraying the edges with a light spray of kerosene is a recent development which holds promise of causing the material to adhere to the sides of the cracked pavement.

Experiments with sulphur as a filler have been tried but almost abandoned because of the danger encountered in handling it. This problem of proper filling material is still unsolved and continued experimenting should go on.



The New Davey Power Take-Off

Truck Service Doubled By Power Take-Off

A power take-off on a motor truck is one of the readiest means for doubling its capacity for work and hence its ability to make greater profit for its owner. The Davey power take-off, invented by Paul H. Davey of Davey Compressor Co., Inc., Kent, Ohio, was first used in driving an air compressor mounted on a truck chassis. This device is equally adaptable for operating other kinds of truck-mounted machinery, such as pumps, portable generating plants for lighting systems, arc welders, etc.

The power take-off operates from the truck drive shaft by a clutch and is controlled from the driver's cab. A pull of the control lever engages the clutch, applying the full power of the truck motor to the operation of the compressor or other equipment, through a sheave and V-belts.

New Light-Weight Pump

A new Bantam-Weight self-priming centrifugal pump, powered with a 2½-hp engine and rated at 8,500 gallons per hour capacity, has been announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio. Weight saving has been accomplished by compactness of design and the use of aluminum and alloy steel construction. It is sufficiently portable to be picked up with one hand.

Priming action, as in other Jaeger Sure-Prime pumps, is entirely automatic. Repriming is also automatic to keep holes dry. Patented self-cleaning shell design, open-type impeller mounted direct on the engine shaft, and patented Lubri-Seal which eliminates shaft packing, are other features.

Four New Truck Models Announced by Studebaker

There are four chassis models in the new line of trucks recently announced by the Studebaker Corp., South Bend, Ind., each of which is designated by a distinctive name. The Ace is the 1½-ton model, of 11,000 pounds gross rating; the 2-ton chassis, with a gross rating of 13,500 pounds, is known as The Boss; The Mogul is the 2½-ton unit, 16,000 pounds gross; while the 3 to 4-ton unit has been named The Big Chief.

W. H. Edwards, Manager of the truck division of the reorganized Studebaker Corp., states that since the introduction of this new line of trucks sales have increased so rapidly that the first four months of 1935 will be the largest in commercial car volume for four years.

Smith of Osgood Dies

The Osgood Co., Marion, Ohio has lost its first Sales Manager, Earl C. Smith, through death. Mr. Smith who has been continuously identified with Osgood since 1910 was among the pioneers to advance the use and distribution of the revolving-type shovel, and was recognized as an authority on steam shovel operation and use.

Littleford Model "C" Pressure Distributor in service of the Richland County Highway Department Shown applying a surface coat to secondary highway at Mansfield, Ohio.

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When it comes to equipment for surface coating and penetration patch work, it will pay you to consider our very complete line. With a Littleford Catalog before you, you can easily select the right outfit for the work you have to do. There are Pressure Distributors ranging in size from 300 to 1500 gallons that handle all types of bituminous material; Tar and Asphalt Kettles; Emulsion Sprayers, Surface Heaters and many other outfits—all designed and constructed for a definite purpose.

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ROGERS GOOSE NECK HEAVY DUTY TRAILER
reaches a NEW HIGH in power and stamina

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Same low loading height as in previous models, for ease and speed in loading, but with 12 wheels—8 rear, 4 front—and a greater margin of strength for handling the heaviest of loads

ROGERS BROS. CORPORATION
108 ORCHARD ST.
ALBION, PA.

Giant Steel Hook Breaks Hard Gravel

(Continued from page 15)

000 cubic yards of rock. The work is in two cuts; the north cut has been finished and the 2-yard Northwest shovel moved to the south cut, where good progress is being made. Starting on August 8, Griffith was the first contractor to begin operations on the canal. At first a Bucyrus-Erie shovel was used in the north cut, but this was later moved to another job.

Waste material is loaded into 25-yard LeTourneau dump buggies, pulled by Caterpillar Seventy-Five tractors. Each of these buggies is equipped with sixteen pneumatic tired wheels, and the all welded steel body is built to slide backward as it dumps, leaving the floor of the body in place. A 12-yard Mack truck is also used in hauling the waste, which is dumped in ravines among the slopes of the mountain near the ends of the cuts. Excavation is made in 30-foot lifts.

Drilling Operations

Major drilling is done with two Cleveland wagon drills, with which holes are put down to a depth of 25 to 30 feet, spaced about 26 feet apart. From 60 to 80 of these are drilled at a time, sprung and then loaded with Atlas 60 per cent stick and 70 per cent bag powder, using about 1½ pounds per cubic yard. As much as 30,000 cubic yards has been broken at a shot. Powder in a recent blast was so accurately gaged that only one hole of the 75 or more blew the tamping. The entire surface of the ground simply rose 8 or 10 feet and collapsed. Much of the rock breaks up in large boulders, requiring secondary drilling, which is done with three Ingersoll-Rand jack hammers. Air is piped to the job through a 3-inch line, from a Worthington compressor, located at a short distance from the cuts, and between the two. A Gardner-Denver sharpening machine and forge are located at the same point. Timken removable bits are used. Considerable trouble has been experienced by the Griffith company in holding drill holes, because of the ravelly nature of the rock. Operations have also been hampered by streaks from 3 inches to 3 feet thick, of an extremely hard rock which sometimes required as many as fifty bits to drill 2 feet.

This firm began work in one shift, which was later increased to three. A maximum depth of 115 feet was reached, with a maximum top width of about 250 feet. The cuts are 69 feet wide at the bottom.

S. M. Griffith is President of the Griffith Co.; John A. Holmstrom is Vice President in charge of all construction work and Cliff Bong is Superintendent of construction.

R. B. Williams, of the Bureau of Reclamation, is Construction Engineer in actual charge of the All-American Canal project, with Grant Bloodgood, Field Engineer; T. A. Clark, Office Engineer and J. C. Thrailkill, Chief Clerk.

Drainage Problem

A problem being considered by government engineers at this writing is that of cross drainage along the canal. Sudden heavy downpours of rain in the desert regions must be taken care of, and it seems likely that some of the larger washes which cross the canal may be carried over it, in order to avoid trouble from silt and debris.

Work at Western End

The western part of the canal runs through fairly uniform ground, of a nature to make team work practical, and here, as an unemployment relief measure, two force account schedules are well under way using nearly a thousand head of horses and mules, with a maximum of 310 men. The width of the canel is first plowed up with gang plows and tractors and the material is then moved to the sides with two-up and four-up teams and fresnos. Tumblebugs, drawn by Caterpillars, are sometimes used where rains and irrigation have saturated the ground and team work is not efficient. In plowing up the area a bond is made by plowing under the banks wherever a fill is to be made.

Work Across East Mesa

Bids were opened on April 25, 1935 and contracts have just been awarded for excavation of about 23 miles of the All-American Canal across the East Mesa, involving approximately 11,300,000 cubic yards of excavation. Schedules 1, 2 and 3 of this work have been awarded to Lewis-Chambers Construction Co., of New Orleans, La., and Schedule 4 to Mittry Brothers of Los Angeles, Calif.

An Oyster Shell Sandwich on Post Oak Road, Houston

Oysters R truly in season for road construction in Texas. In the January issue we carried the story of a road-mix job south of Port Arthur, Texas, where oyster shells were used as aggregate. Now we find that Harris County has gone the State one better and has created an oyster shell sandwich on the Post Oak Road, in the suburban section of Houston.

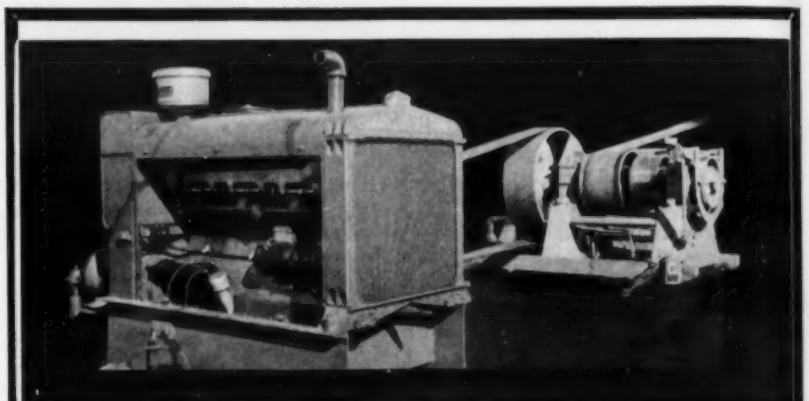
On a 3 to 4-inch base of compacted gravel, county forces, under the direction of C. R. Haile, County Engineer, laid down 6 to 8 inches of oyster shell and compacted it to 4 inches by rolling. On this, 4 inches of loose crushed rock was placed and the reconstruction completed with 2-course direct penetration, using asphalt emulsion and a seal coat.

The sandwich really works and was a tasty job for a secondary road.

First Uses of Common Salt For Road Construction

Our contemporary, *Engineering and Contract Record*, Toronto, Ontario, records in a recent issue the first use made of common salt, sodium chloride, in the field of road construction. It reports in an article by R. A. McStay, that in 1927, A. R. Chambers of New Glasgow, N.S., irritated by the clouds of dust that arose from the province's gravel and macadam highways, sought a solution to this nuisance problem. Mr. Chambers knew that for centuries the ceramic industry had been familiar with the fact that small additions of salt to clay improve the latter's drying properties. Salt glazing at high temperatures, he found, is a very ancient practice and had been familiar to the potters of ancient Egypt and Arabia. But, as far as he could find out, no attempt had been made to extend this principle to other fields. So, he began to study other applications of it and naturally thought of it as a possible remedy for the dust conditions on Nova Scotia's highways.

Determined to prove the value of his idea, he not only developed sample surfaces for experts to study but actually laid short stretches of roadway near Elmsdale and Truro, N. S., where car drivers and highway users in general could see for themselves the advantage of his discovery. These stretches of highway were called to the attention of engineers from Michigan who became enthusiastic, adopted the method as their own and proceeded to develop what is now generally known as the "Michigan Road."



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WASHINGTON, D. C.

The New 5-W Bucyrus-Monighan

New Walking Dragline Has Special Features

The new 5-W addition to the Bucyrus-Monighan family of walking draglines is featured by its compactness, transportability and low bearing pressure. The center section of this machine's revolving frame, with all principal machinery assembled in place, is shipped in one unit, saving time in assembly on the job and permitting easy shipment from one job to another.

Swing mechanism and fuel oil tanks are below the deck; and the machine is so balanced that little dead counterweight is required. Elimination of excess weight has been achieved further by electric welded construction.

Sensitive controls permit rapid operation. The levers, operated by a finger pressure, are short and placed close together. Like all other Bucyrus-Monighan draglines, direction of travel is governed by simply pointing the boom. The machine travels in straight lines or can zig-zag to avoid obstacles.

Complete information on this new 5-W model may be secured by interested contractors direct from Bucyrus-Erie Co., South Milwaukee, Wis.

Care of Stabilized Roads

Any road when opened to traffic is subjected to the ravages of traffic and weather, and it is necessary to institute a system of maintenance that will counterbalance these deteriorating influences. A stabilized wearing course requires a method of upkeep differing from that for loosely-bound surfaces. Due to the controlled design and the degree of consolidation attained in these roads, the greater service value warrants attention to its preservation.

The stabilized road is as good, and no better, than its maintenance. It is therefore important that the nature of care should provide for prompt repair of any surface injuries, rather than permit accumulative damage that will involve periodic reconstruction.

The Calcium Chloride Association makes the following suggestions for the maintenance of this type of roads. Small holes or corrugations should be removed by blading only during and after rains which are sufficient to make the surface workable. The advantages of blading when the road has been thoroughly wet are easier workability; minimum disturbance and dissipation of calcium chloride which has been driven deeper into the road by the rain; presence of sufficient moisture to permit consolidation of reshaped loose material under traffic.

Blading only after rains is usually sufficient to preserve smooth riding qualities, but in prolonged dry periods it is sometimes desirable to eliminate any scattered pits which may develop by hand patching. A good mixture for such work consists of graded aggregate under ½-inch in size, mixed with at least an equal weight of stable sand clay. Calcium chloride should be added to the patching mixture at the rate of 100 to 150 pounds per cubic yard, in order to provide moisture for rapid compaction.

Treating Creosote Burns

Valuable safety and first aid hints on the subject of creosote burns comes to us from the News Letter of the Construction Section of the National Safety Council and we pass them on to you.

Creosote used in the preservative treatment of timber contains carbolic acid (which by the way is not an acid). During hot weather it may ooze to the surface of the timber. Do not touch the eyes or any sensitive surface of the body with fingers which may have creosote on them. Do not sit or lean against creosoted timber if your clothing is thin. Avoid burns on the hands by wearing good leather gloves.

Sometimes in cutting the timber with an axe or in using other tools, the creosote may spatter and get on the face and hands or in the eyes.

If a creosote burn occurs, flush it with water. Then apply alcohol or epsom salts if you have either. One or two sodium borate (borax) tablets from an eye dressing kit may be used in solution for this purpose. The burn should then be treated like any other burn.

If the burn is in the eye, wash it with water by means of a dropper. Then dissolve a borax tablet in the proper bottle filled with water and flush the eye with the solution, using a dropper. Be careful not to direct the stream on the colored part of the eyeball. Creosote burns in the eye should have medical attention as soon as possible, preferably from an eye specialist.

It is recommended that people working around creosoted timber, especially during very hot weather, wear goggles to protect their eyes from the possibilities of such burns. On one job which has come to our attention, the men smeared their faces and arms with zinc oxide ointment as a protection against possible burns.

Complete crushing, screening and loading plant with primary jaw crusher, secondary roll crusher and power unit. A capacity wonder.

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The New Midwest Dirt Scoop, Showing Pneumatic Tires, and the Rear Wheels Mounted Outside Frame

Air-Powered Dirt Scoop With Pneumatic Tires

A 6-wheel 10-cubic yard scoop which carries its own power plant for pneumatic operation, making it possible for any tractor to be used to haul it, has been announced by the Midwest Piping & Supply Co., Inc., 1450 So. Second St., St. Louis, Mo. This scoop makes a maximum cut of 12 inches, has a bowl clearance of 18 inches in carrying position and its maximum dumping angle is vertical. The material can be spread from a thin film up to 25 inches thick.

The tubular frame, which is rounded in front and in the rear, carries the entire unit with the two front wheels inside the frame with a drawbar arrangement providing an exceptionally short turning radius. The rounded front also prevents catching on stumps and other obstructions. Two of the four rear wheels are mounted outside the frame but are easily removable when cutting vertical banks so that the machine can work close to the bank.

An unusual feature of this machine is the fact that with the bowl in "down" position, the wheels can be raised free of the ground. This feature is helpful in extricating the unit when mired or when a tire must be changed.

New Light Grab Bucket for Rehandling Materials

A new grab bucket which has large capacity for its weight has been announced by the Mead-Morrison Division of the Robins Conveying Belt Co., 15 Park Row, New York City. This type-RH rehandling grab bucket has special shells of an intermediate shape between flat and round, giving the advantages of the flat shell for digging and filling and of the round shell for quick discharge. Its low height and extra width, as well as low center of gravity, produce greater stability on a pile.

The bucket has a rope reeving without reverse bends and a three-part purchase for rapid opening and closing. The top head is of structural steel with a manganese steel fairleader bolted in. The hinges are of cast steel of single and double ear construction with large bearings; with high-pressure lubrication. The links are of large diameter steel tubing welded to the cast steel ends, giving greater strength with less weight and providing rounded surfaces which cause less damage to barges or cars than the usual sharp cornered construction.

A Mixed-in-Place Road Completed in N. Carolina

The North Carolina State Highway Department recently completed a mixed-in-place resurfacing job on State Route 211 between Lumberton and Clarkton, N. C. An Adams Retread Paver No. 2 mixed the sand, crushed stone and cut-back asphalt, mixing and leveling the material in two round trips. It was then compacted with a 5-ton 3-wheel roller.

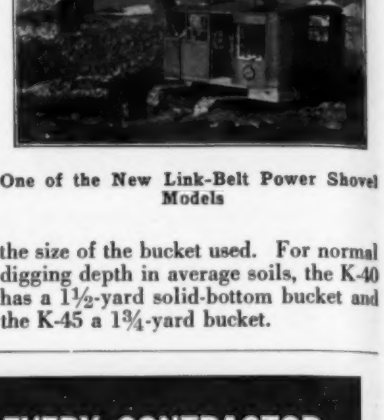
This retread machine is equipped with three sets of mixing blades and a rear levelling blade turning over the aggregate four times in one trip, thus accomplishing in a single trip what would require four trips with a single blade machine. An Allis-Chalmers Model K tractor equipped with street plates furnished the power to haul the Retread Paver.

Two Improved Excavators Announced by Link-Belt

Two new models of crawler-mounted shovels, cranes, and draglines to be known as Models K-40 and K-45 have been announced by Link-Belt Co., 910 S. Michigan Ave., Chicago, Ill. While the basic design is similar to that of the two models that are discontinued, the new machines embody other advanced features.

The new models, like other Link-Belt units, are built for heavy-duty service and arranged for gasoline engine, diesel engine or electric motor drive and are convertible. Another feature is the ability to ship the complete machine on a flat car without dismantling, thus effecting a saving in both time and money. Although the new models include an improved two-tread steering arrangement, a centralized lubricating system on the rotating frame, and other improvements in both mechanical and structural details, the prices are the same as the models which the new units replace.

The new machines have a 22-foot shovel boom, a 16-foot 6-inch dipper stick, and an all-manganese steel, heavy-duty dipper, of 1¼ or 1½ cubic yards capacity. As draglines, these machines handle a 1¼ or 1½-yard heavy-duty bucket on a 45 to 50-foot boom for the K-40 and for the K-45, a 1½ to 1¾-yard bucket. As a crane the K-40 is rated at 21 tons at a 12-foot radius and 6,600 pounds at 45-foot radius, on a 45-foot boom. The K-45 has a capacity of 25 tons at 12-foot radius and 7,600 pounds at 45-foot radius on a 45-foot boom. As a trench hoe, the character of the work and digging depth determine the size of the bucket used. For normal digging depth in average soils, the K-40 has a 1½-yard solid-bottom bucket and the K-45 a 1¾-yard bucket.



One of the New Link-Belt Power Shovel Models

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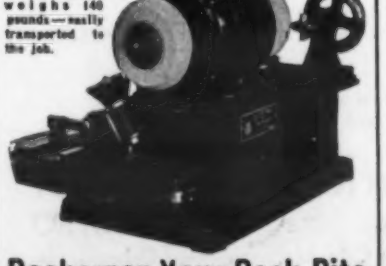

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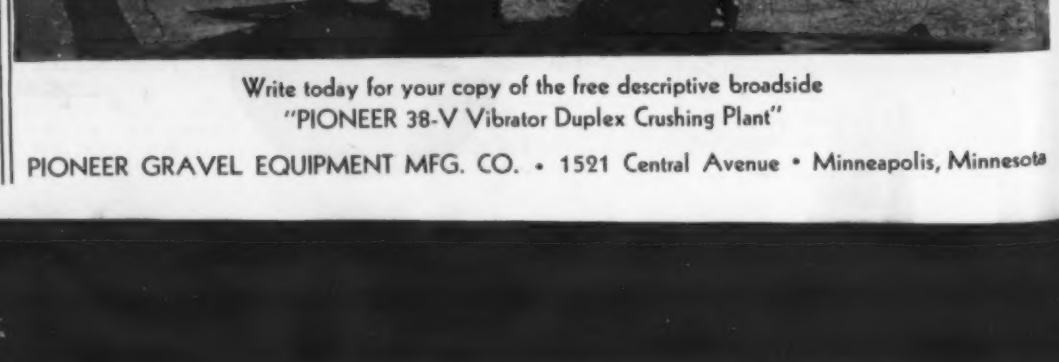

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New Elevating Grader Has Three Wheels

A new hydraulic power operated elevating grader which is claimed to provide increased capacity, regardless of ground worked, by a combination of weight distribution, elevator design, plow beam control and steering, has recently been announced by the Austin-Western Road Machinery Co., Aurora, Ill.

By supporting the welded, one-piece, steel frame on three wheels, the weight of the full loaded elevator is counterbalanced so that the 32-inch disc plow can be forced down and worked to maximum capacity.

The elevator, driven at high speed by universal shaft, gets material away from the plow as fast as it is dug. It is equipped with anti-friction rolls and troughed belt. The bevel gearing connecting the head drum with the drive shaft runs in oil.

The stiff leg plow is equipped with an extra strong beam and standard. The beam is arched directly ahead of the plow to eliminate choking. The plow can be set to float without affecting the lifting operation and the operator can take a deep cut by forcing the plow down or a wide shallow cut by varying the position of the furrow wheel from the platform while the grader is in motion. The furrow wheel adjustment is hydraulically controlled.

All wheels are Timken bearing equipped. The front wheel is carried in a large, one-piece welded yoke and steered by adjustable pole through medium or large connecting links above the frame deck. The rear right wheel is laterally adjustable to increase tread.

Hydraulic controls raise, lower or hold the elevator and plow in any position. The pump providing power does not operate under load when the elevator, plow or other members are in "hold" or locked position.

To simplify operation, save gas and increase motor life, clutch and throttle controls are connected and synchronized. The throttle closes an instant after the clutch is released and opens an instant before the clutch is engaged.

Thew Shows Diesel Shovels At Special Demonstration

The Thew Shovel Co., Lorain, Ohio, was the host at a "back yard" party on May 24 when a demonstration of 1-yard, 1½-yard, and 2-yard Lorains, all powered with Caterpillar diesel engines, and a Mack-truck-mounted Universal shovel, was held for owners and prospects from the immediate vicinity and members of the International Union of Operating Engineers of Cleveland, Ohio.

About fifty men turned out, spending the afternoon at the plant watching the demonstration by Thew operators. Then they were given the opportunity to get up on the machines and run the shovels themselves. This activity proved to be the most popular and successful part of the program.

In the evening dinner was served at the Antlers Hotel at Lorain and at 7:30 a meeting was held at which C. L. McMullen, Caterpillar Tractor Co., delivered a lecture on diesel engines illustrated with slides and talking motion pictures. At the evening meeting, attendance was swelled to about 200.

Welding Distributor Moves

T. A. Canty of Baltimore, Md., distributor of Lincoln arc welding equipment and supplies, has found it necessary, due to substantially increased business, to move from its former location at 116 East Centre Street to larger quarters at 1023 Cathedral Street.

The new location provides every facility for displaying and demonstrating the latest developments in arc welding and a special booth has been arranged for giving welding operators instruction in any phase of arc welding. In addition to providing every assistance in arc welding problems, the company maintains a complete stock of arc welding machines, electrodes and supplies for welding by the Lincoln Shielded-Arc process.

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TOWER TYPE
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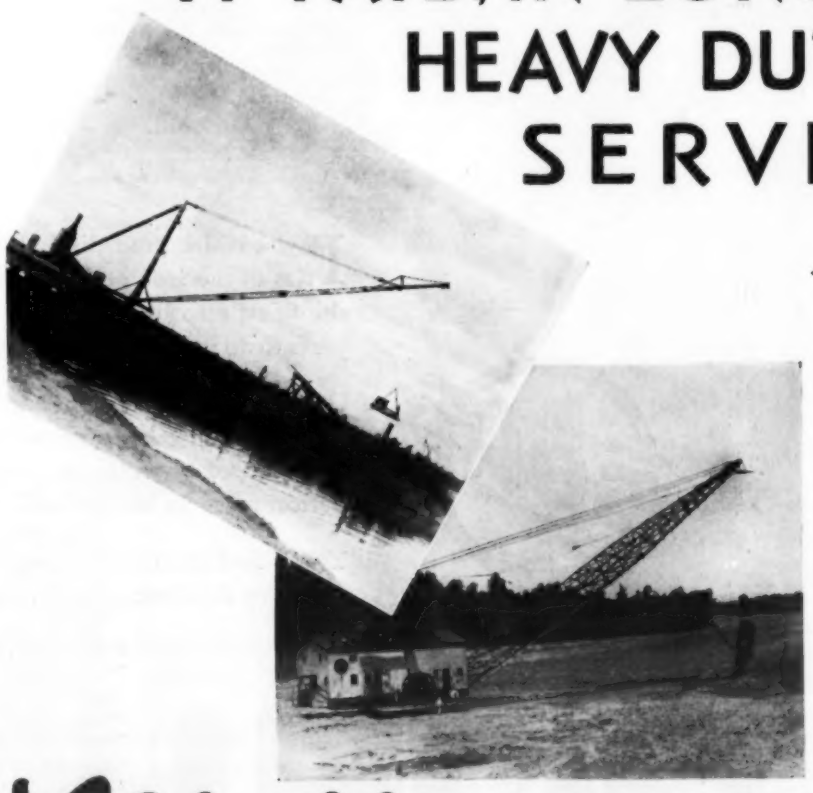

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Form Clamps for Concrete

411 Pony clamps for making and holding concrete forms, which are fittings designed for use with ordinary ¾-inch pipe and are easily adjusted, and hold firmly in place until released, are described in literature which the Adjustable Clamp Co., 427 N. Ashland Ave., Chicago, Ill., will be glad to send on request.

Practical Methods for Modern Paving

412 The Equitable Asphalt Maintenance Co., Inc., Kansas City, Mo., has issued a booklet, "Practical Methods Applied to Modern Paving" which gives valuable information to those interested in modern asphalt paving methods. It contains information on the Equitable surface heater and photographs of streets where this method has been used.

Dark Colored Concrete

413 A book on attractive, restful, and economical dark-colored concretes produced by emulsified carbon black and showing by the color of the back cover the various shades which are secured by 1, 2, 4 and 6 pounds of HiBlak per sack of concrete has been issued by Binney & Smith Co., 41 E. 42nd St., New York City.

Anchoring New Concrete to Old

414 Catalog No. 7 issued by the American Expansion Bolt & Mfg. Co., 108-128 N. Jefferson St., Chicago, Ill., describes American expansion hook bolts and anchors which make new concrete in repairs and extensions an integral of the old concrete with firm reinforcements between the two materials.

Safety Signs

415 A new well-illustrated booklet describing the complete line of safety signs made by the Mine Safety Appliance Co., Meade, Thomas and Braddock Aves., Pittsburgh, Pa., may be secured free on request by interested contractors and highway engineers direct from the company.

Sand and Stone Spreader for Trucks

416 The Good Roads Champion spreader for attaching to trucks, which will spread stone chips, cinders or sand, is completely described and illustrated in literature which the Good Roads Machinery Corp., Kennett Square, Pa., will be glad to send on request.

An All-Welded Dragline Bucket

417 Complete information on the Yaun all-welded dragline bucket which is available in two types, the shell-type bucket and the basket type, in ⅝ to 12-cubic yard capacities, may be secured by interested contractors from the Yaun Welding & Boiler Works, 133 North St., Baton Rouge, La.

Quantities for Stabilized Roads

418 A new bulletin prepared for the use of highway engineers and contractors by the Calcium Chloride Assn., Penobscot Bldg., Detroit, Mich., bears the title, "Computing Quantities of Aggregate, Binder-Soil and Calcium Chloride for Compacted Stabilized Gravel Roads." It is a handy manual for estimating the quantities of loose materials needed to produce compacted stabilized roads in various widths and depths and is replete with tables of quantities by weight and by volume. Ask for Bulletin No. 21.

Cost-Reducing Portable Belt Conveyors

419 Folder No. 1414 issued by Link-Belt Co., 300 W. Pershing Road, Chicago, Ill., illustrates and describes the features of Link-Belt portable belt conveyors for contractors and material yards.

Size Card for Steel Plates

420 A new size card, showing the sizes of Lukens rectangular and circular steel plates, including rolled steel plates for use in building construction, bridges and similar structures, is available to those interested by writing to the Lukens Steel Co., Coatesville, Pa.

Standard Side Suction Pumps

421 The Lawrence Machine & Pump Corp., 371 Market St., Lawrence, Mass., has recently issued Bulletin 202 describing Lawrence standard side suction pumps, both belt-driven and direct-connected, and showing their various applications.

Folding Barricades

422 Complete information on Oshkosh folding barricades, which are handy, compact and strong, may be secured by interested contractors, state and county highway officials from the Leach Co., 412 E. Main St., Oshkosh, Wis.

Portable Arc Welders

423 Universal Power Corp., Clarkstone Road, Cleveland, Ohio will be glad to tell you all about its Universal arc welders which are claimed to offer easy, economical operation, portability and excellent welding results.

Dual Ratio Four-Wheel Drive

424 The Thornton dual ratio four-wheel drive which makes it possible to convert the small capacity truck into a large capacity unit easily and economically is described in literature which the Thornton Tandem Co., Detroit, Mich., will be glad to send on request.

Lighting Up Your Job

425 LeRoi Co., Milwaukee, Wis., has announced a new guaranteed 5-kw D.C. generating plant for furnishing power for lights for night work, which is described in literature which those interested can secure upon request.

New 16-Page Asphalt Booklet

426 A new 16-page illustrated booklet describing Texaco emulsified asphalt has been issued by the Asphalt Sales Dept., The Texas Co., 135 E. 42nd St., New York City. This booklet describes briefly the particular advantages of emulsified asphalt and explains concisely how to use Texaco emulsified asphalt for cold patching, pre-mixed type surfacing, penetration macadam construction, surface treatment, maintenance by penetration method, mixed-in-place construction, and pre-mixed asphaltic concrete. There are also helpful tables for rapid calculation of quantities.

A New Motor-Compressor

427 Complete information and prices on the Smith motor-compressor which consists of the patented Smith compressor head for mounting on Ford Model A or B motors may be secured by those interested from Gordon Smith & Co., Inc., 1220 State St., Bowling Green, Ky.

Rebuilt Clamshell Buckets

428 George Haiss Mfg. Co., Inc., Canal Pl. & E. 142nd St., New York City, will be glad to send to interested contractors complete information and prices on Haiss factory rebuilt clamshell and other types of buckets for contractors' use.

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Cost of Drilling Holes in Mud-Jack Operations

Since the Mud-Jack system of raising pavement slabs was developed, it has been common practice to use compressed air jack hammers to drill the necessary holes through the slab. Investigation in Missouri, according to an unpublished report by C. P. Owens, Engineer of Maintenance, Missouri State Highway Department, made available by the Highway Research Board of the National Research Council, has revealed many cases of spalling of the underside of the slab by this method of drilling. Spalls were sometimes 12 to 18 inches in diameter and 2 to 3½ inches thick.

To provide a better method of drilling, the Bureau of Maintenance designed a portable rotary shot drill and placed orders for their manufacture. The drill, powered by a gasoline engine, is mounted on a small four-wheel chassis. A slow motion power drive facilitates movement of the drill from hole to hole. The machine is equipped with brakes and steering lever. For long moves, the machines are loaded on specially equipped motor trucks. Two drills and one motor truck make a working unit.

Accurate costs on this type of drilling with jack hammers are not available but several test runs indicated that the cost averages 20 cents per hole. Costs for the rotary drills have been compiled for a five-month period of operation. The items of cost include: salary and expenses of the field foremen; labor; truck rental, operation at 5 cents and depreciation at 6 cents per mile; core drill rental, operation 55 cents and depreciation 30 cents per hour. Depreciation costs contemplate retirement of the purchase price during the life of the equipment but do not include interest, insurance or taxes. Supervision and overhead are not included in the costs.

Cost of Drilling Holes in Concrete Pavements with Portable Rotary Shot Drills.
(2½ inch diameter holes)

Type of Aggregate	Hours Worked	Holes Drilled	Total Cost	Cents Per Hole	Minutes per drill per hole
Gravel-plain	1630.5	11,315	$ 7,296.35	64.8	17.1
Gravel-reinf.	540.5	2,261	2,535.93	112.0	28.5
Limestone-plain	2513.5	40,982	10,582.32	25.8	7.3
Limestone-reinf.	398.0	4,123	1,727.87	41.9	11.5
Total	5082.5	58,681	$22,142.47		
Average				37.7	10.3

Artificial Pond Is Dug with Dragline and Scraper

An interesting excavation contract was recently completed by John Dehner, Fort Wayne, Ind., contractor, for the State Department of Conservation in a forest preserve near San Pierre, Ind. The artificial pond is intended as a waterfowl refuge and as a natural improvement to the scenery.

The plans called for a pond about 300 feet across and 8 feet deep located in a large clearing. The soil was sandy loam. Using a 1-yard Sauerman Crescent bucket and carrier operated by a Northwest dragline, the work was completed in 80 days, running two 8-hour shifts per day with an average of 20 cubic yards per hour dug, hauled and spread on the bank, the total estimate being 25,700 cubic yards.

It is interesting to note how the contractor handled this job. A wire cable about 225 feet in length extended out from the point sheave on the boom and served as a track-line for the carrier to which the Crescent bucket was attached. The outboard end of this track-line was attached to a fixed anchorage in the center of the designated pond area. When the boom machine had completed its 80-day circuit of this area, the result was a circular pond with an even bank all around and with a small island in the center.

Highway work was the first to get under way on the public works program of the National Recovery Act. The first contract was started in Utah on August 5, 1933. The total employment on PWA rolls for that month was 4,600, of which 4,000 or 86 per cent was on highways. In September 1933, highways accounted for 90 per cent of the 34,000 employed, in October 74 per cent; November 58 per cent; and in December 56 per cent. During this period highway appropriations were only 12 per cent of the total construction authorized.

—From a Paper by H. C. Whitehurst presented before the American Road Builders' Association.

DIESEL EARTH-MOVING ARMADA IN ACTION

A Section of Crow Brothers' Contract on Jack Rabbit Trail near Riverside, Calif. In Five Months a Fleet of Eight Caterpillar Diesel and Two Gasoline-Powered Tractors Hauling 12-Yard Scrapers, Rippers and Tampers Moved 650,000 Cubic Yards of Dirt.

Road Guards for Bridges Mounted with Springs

Bridge members, bridge sidewalks and vehicular traffic can be protected to greater advantage if road guard is used on every bridge structure. Rex guard made for this purpose by the Rex Road & Bridge Guard Co., 5544 Harrison St., Pittsburgh, Pa., consists of rolled steel channels of formed sections of variable thicknesses. Flexibility is provided by the back support which involves either one or two flat spring steel sections, the latter in turn bolted to the bridge members. Recommendations favor a distance between supports of not over 20 feet.

Flanged sections with rounded corners offer the least possible damage to vehicles and passengers. This design also has the advantage of providing for expansion and contraction as the result of temperature changes.

A 110-foot installation of this guard on the Highland Park Bridge, Pittsburgh, Pa., was made of ¼-inch plates formed into channel sections and supported on steel springs, 32 inches long and 8 inches wide, fastened to the bridge members about 13 feet apart. The channel has a 12-inch face and is placed 24 inches above the roadway to the center of the guard. This unit is so flexible that it responds easily to the pressure of the hand but it is designed primarily to withstand the heavy impact of motor vehicles traveling at high speed which may deviate from their proper course.

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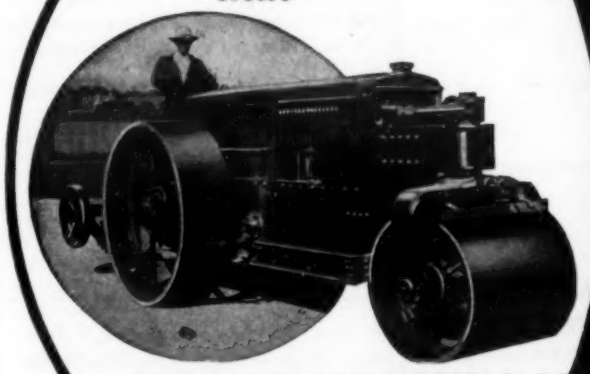

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Representing

Minneapolis-Moline Power Impl. Co.
Climax Engineering Co. **Twin Disc Clutch Co.**
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Wisconsin Motor Corp. (Air-Cooled)
Stover Engine & Mfg. Co.
Scintilla Magneto Co.
Wico Electric Co. **Pierce-Governor Co.**
Portable Power Tool Corp. **Hercules Prod. Co.**
LeRoi Co.

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116 John Street Horseheads, N. Y.

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ALLIS-CHALMERS—Tractors, Graders
A-W—Traffic Tread
BAKER—Road Drags, Snow Plows
C. M. C.—Wonder & Marsh-Capron Mixers
HUBER—Rollers
HOTCHKISS—Sidewalk Forms
HANSON—Excavators
INGERSOLL-RAND—Air Compressors
JACKSON—Wheelbarrows
MILES—Concrete Block Machines
THE NORTHERN—Gravel & Coal Conveyors
WILLIAMSPORT—Wire Rope
WISCONSIN SPECIAL—Snow Plows

H. O. PENN MACHY. CO., INC.

140th St. & East River Bronx, N. Y.

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MARION Shovels—⅝ to 2-yd
CATERPILLAR Tractors
LaPLANT-CHOATE Wagons and Bulldozers
BLAW-KNOX Scoops
MARLOW Pumps
WARCO Graders
PIERCE Rollers
SPEEDER Shovels, ½ to ⅝-yd.
LeROI Compressors and Engines
HELTZEL Steel Bins
HOTCHKISS Forms
SMITH Mixers, Pavers
LE TOURNEAU Scrapers

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GORMAN-RUPP—Centrifugal Pumps
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HERCULES—Gas Road Rollers
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White Mfg. Co.—Chausse-White Asphalt Plants & Heaters
McCormick-Deering—Trac-TracTors
McKiernan-Terry Corp.—Pile Hammers
Michigan—Power Shovels
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Rome—Graders
Schramm, Inc.—Air Compressors
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Baker Manufacturing Co.
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Blaw-Knox Co. (Ateco Div.)
All Steel Products Mfg. Co.

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Timken Roller Bearing Co.—Detachable Bits
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Jaeger Machine Co. } Mixers, Concrete
Lakewood Engineering Co. } Handling Equipment
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Hewitt Rubber Corp.—Hose and Belts
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Taylor-Wharton Iron & Steel Co.—Steel Castings

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BUHL—Air Compressors
TWIN DISC—Clutches for all purposes
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Elgin Sales Corp.
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Fate-Root-Heath Co.
Garco Manufacturing Co.
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Ideal Power Lawn Mower Co.
Kalamazoo Railway Supply Co.
LeRoi Co.
Linde Air Products Co.
M. & M. Wire Clamp Co.
Niagara Mfg. Co.
Novo Engine Co.
Baton Valve Bag Corp. (Wire Ties)
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Sheldon Mfg. Co.
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American-Terry Derrick Co.—Derricks, Travelers
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Universal Form Clamp Co.—Concrete Accessories
Sasgen Derrick Co.—Derricks and Winches
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Lakewood Engineering Company
Pioneer Gravel Equip. Mfg. Co.
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Sterling Wheelbarrow Co.
Jaeger Machine Company
Ingersoll-Rand Co.
Foote Co.—Pavers
Littleford Bros.
Thew Shovel Company
Trackson Co.—Crawlers, Hoists
McCormick-Deering—Tractors
Lidgerwood Mfg. Co.
Galion Iron Works & Mfg. Co.
Chas. Hvass & Co., Inc.

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LeRoi Co.
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Wellman Engineering Co.
W. Toepfer & Sons Co.
Heltzel Steel Form & Iron Co.
Flexible Road Joint Mach. Co.
McKiernan-Terry Co.
Homestead Valve Mfg. Co.
Sasgen Derrick Co.
American Hoist & Derrick Co.
Richmond Screw Anchor Co.
Trackson Co.
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Marion-Steam Shovel Co.
Hughes-Keenan Co.
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Nordberg Mfg. Co. (Symons Crushers)
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Schramm, Inc. (Compressors)
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Buda Co. (Diesel & Gas. Eng.)
Baker Mfg. Co.
Walter Motor Truck Co.
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Winslow Gov't Standard Scale Wks., Inc.
Hercules Company
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HOUGH-UNIVERSAL Road Sweepers
JACKSON Concrete Placement Vibrators
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MICHIGAN ⅜-yd. Truck and Crawler Shovels and Cranes
REX Moto-Mixers, Building Mixers, Pavers and Pumps.

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CHAIN BELT Concrete Mixers, Saw Rigs, Pavers
NOVO Engines, Hoists, Pumps
WYOMING Shovels, Picks
SAUERMAN Cableways
CLEVELAND Wheelbarrows
BATES Wire Ties
PULSOMETER Steam Pumps
PATENT Safety Swinging Scaffolding
TRU-LAY Wire Rope
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SULLIVAN Compressors
ETNYRE Asphalt Distributors
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Milwaukee Wisconsin

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PIONEER Gravel Equip.
DROTT Bulldozers, Scrifiers, Scrapers, Eliminators
HOUGH-UNIVERSAL Sweepers
WAUSAU Snow Plows
DAVEY Air Compressors
KINNEY Road Oilers
TORO Highway Mowers
HERCULES Road Rollers
LA CROSSE Tu-Way Trailers
CLEVELAND Rock Drills
HAUCK Tar Kettles, Heaters
KOB Sand Spreaders
RUSSELL Plows, Scrapers, Drags
WAUKESHA Power Units
TIMKIN Roller Bearings
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OSGOOD Shovels—all types
WEHR CO.—Road Graders, all sizes
TRACKSON CO.—Crawler Wagons, Crawlers
MICHIGAN Power Shovels
SCHRAMM Compressors

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BUFFALO-SPRINGF'LD ROLLER CO. Road Rollers
BARNES MFG. COMPANY—Pumps
THE FOOTE COMPANY—Multifoote Pavers
LITTLEFORD BROTHERS—Asphalt Equipment
PIONEER GRAVEL EQUIP. MFG. CO. Crushing & Screening Plants
SULLIVAN MACHY. CO.—Compressors & Tools
THEW SHOVEL COMPANY—Shovels, Cranes, Draglines

THE C. H. JONES COMPANY

Construction and Industrial Equipment

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CLETRAC Crawler Tractors and Allied Equipment
GALION Graders and Road Building Mach'y
LIMA and **BAY CITY** Power Shovels
SULLIVAN Portable Air Compressors and Tools
DIAMOND Gravel Crushing and Screening Plants
JAEGER Concrete Mixers, Pumps, Hoists
LINK-BELT Elevating and Conveying Mach'y
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327 So. 16th St. Milwaukee, Wis.

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Bates Wire Ties
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Buffalo-Springfield Co.
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Clyde Iron Works
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Godfrey Conveyor Co.
Iowa Mfg. Co.
Killefer Mfg. Corp., Ltd.
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McKiernan-Terry Corp.
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Marsh Capron Mixers
Wonder Concrete Mixers
Marlow Centrifugal Pumps
Marlow Diaphragm Pumps
Chrysler Portable Air Compressors
New Haven Burlapped-Cotton Blankets
Hayward Clamshell Buckets
Huber Rollers
Archer Towers, Buckets
LaCrosse Tu-way Trailers
Burch Stone Spreaders
Sasgen Derricks, etc.
Fiery Hoists
R-B Power Subgrader
Miles Block Machines
Pulsometer Steam Pumps
Bay City Truck Cranes
Tru-Lay Steel Cable
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Cleaver Tank Car Heaters
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D-A Lubricant
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Hough-Universal Sweepers
Hyster Hoists, Yarders
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Pioneer Gravel Equipment
Philip Carey Elastite
Rosco Oil Distributors
Rotary Snow Plows
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The Byers Machine Co.
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Master Equipment Co.
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The W. K. M. Company
The Buda Company
Highway Trailer Co.
Pioneer Gravel Eq. Mfg. Co.
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Wood Hydr. Hoist & Body Co.
R. G. Le Tourneau, Inc.
The Anthony Co., Inc.
Williamette-Hyster Co.

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RANSOME CONCRETE MACHINERY CO.—Concrete Mixers and Appliances
BLAW-KNOX CO.—Clam-shell Buckets, Steel Forms, Steel Buildings, Steel Bins.
CATERPILLAR TRACTOR CO.—Tractors and Road Machinery
RICHMOND SCREW ANCHOR CO.—Concrete Specialties
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NORTHWEST ENGINEERING CO.—Gasoline Cranes and Shovels
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Member: Associated Equipment Distributors

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Representing

BLAW-KNOX Buckets, Forms
INGERSOLL-RAND Compressors
MUNDY Hoists
AUSTIN-WESTERN Graders, Crushers, Rollers, etc.
BARBER-GREENE Loaders, Conveyors
NORTHWEST Cranes, Shovels
HOMESTEAD Hypressure Jenny
EASTON Dump Bodies, Cars, Track
TRACKSON Tracks, Cranes
ARCHER Towers, Spouting Equipment
REX Mixers, Pavers, Pumps
CLETRAC Tractors
NEWPORT Culvert Pipe
VULCAN Gasoline Locomotives
DOBBIE Derricks
HOUGH—"Universal" Road Sweeper

Also Wheelbarrows, Carts, Benders, Cutters, Shovels, etc.

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Crocker-Wheeler Elec. Mfg. Co.
Deming Company
Gardner-Denver Co.
Gruendler Crusher & Pulverizer Co.
George Haiss Mfg. Co.
Heltzel Steel Form & Iron Co.
Kensington Steel Co.
Linn Mfg. Corp.
Littleford Bros.
MacWhyte Company
Manhattan Rubber Mfg. Co. Division
J. S. Mundy Hoisting Engine Co.
National-Superior Co.
The Osgood Company
Timken Roller Bearing Co.
Vulcan Iron Works
T. B. Wood's Sons Co.

Contractors' Equipment in Stock in Our Roanoke Warehouse

THE ALBERT OLSON CO., Ltd.

1148-50 Osler Street

REGINA, SASKATCHEWAN CANADA

Representing

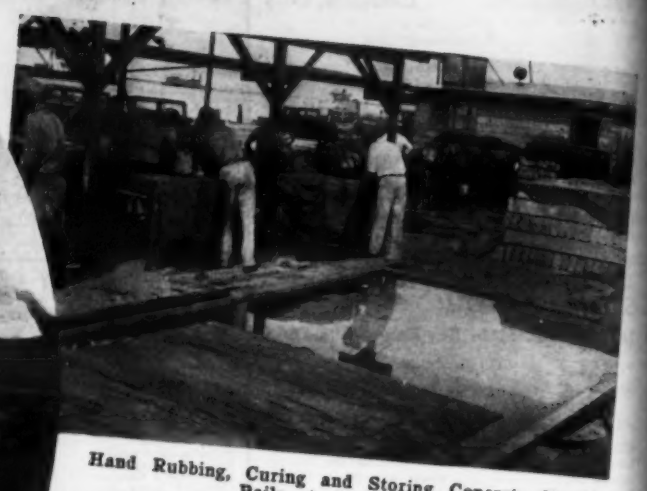
"CATERPILLAR" Tractors
Road Equipment
Combined Harvesters
PIONEER Gravel Equipment
LENHART Dump Wagons
LA PLANT-CHOATE Equipment
KILLEFER Scrapers
EUCLID Equipment
P. & H. Shovels and Cranes
PEDLAR PEOPLE'S Culverts

Contractors and Engineers Monthly

The Gang Molds for the Apalachicola Bridge Hand-Rails. See Page 17.

C. & E. M. Photos

James P. Ewin, Vice President of Doullut & Ewin.



Hand Rubbing, Curing and Storing Concrete Hand-Rails at Apalachicola.

C. & E. M. Photo

Loading Crawler Wagons with a 2-Yard Dragline on the Harris, Brandenburg & Greeson Levee Contract at Deer Park Bend, La. See Page 10.

C. & E. M. Photo

A. G. Johnson, Superintendent for Crawler Outfit at Deer Park.

C. & E. M. Photo

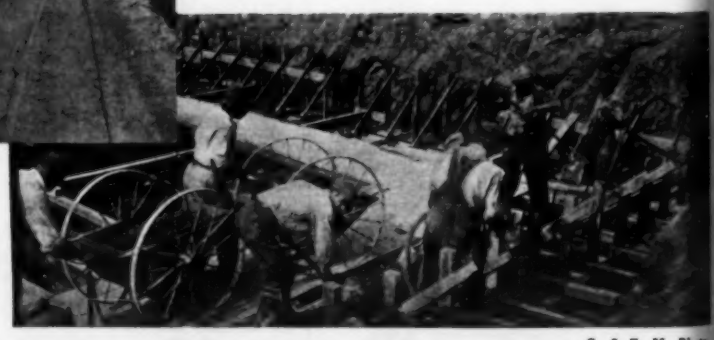
Twin Mixing Plants and Towers for the Rochester, N.Y., Sewage Works Extension. See Page 2.

Thompson-Starrett Co. of New York Uses This Ford V-8 to Haul Grease and Oil to Its $300,000 Worth of Equipment Near Shaver Summit on the Colorado River Aqueduct.

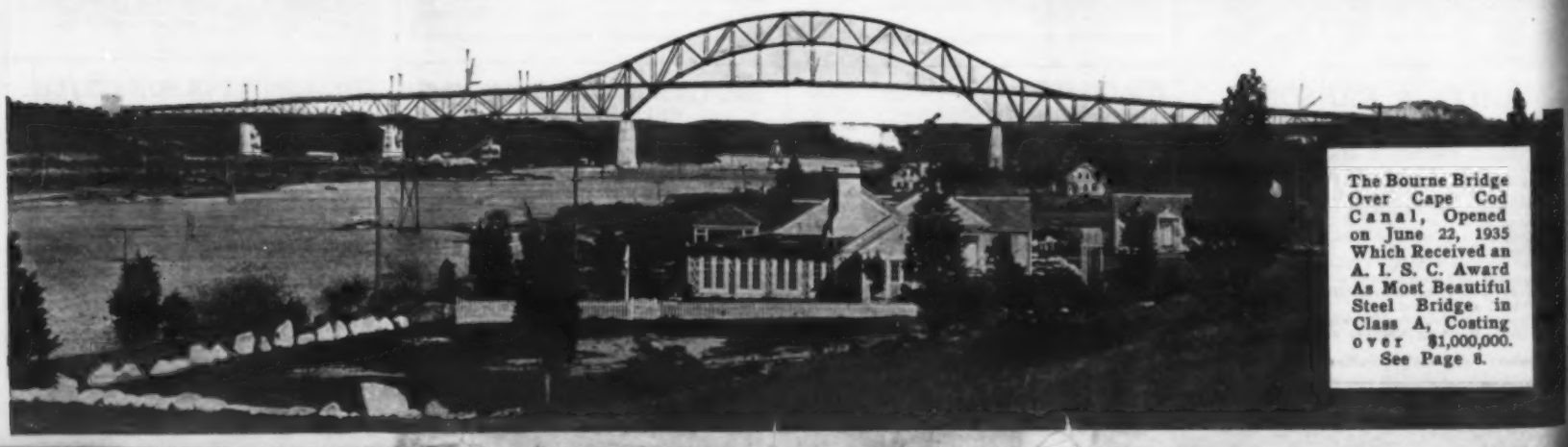
C. & E. M. Photo

Applying Tar Prime on Inverted Penetration Contract of McDougald Const. Co., near Chester, S.C. Note Accuracy With Which Driver Followed Twine with Telltale Attached to Pole at Front of Truck, and Uniformity of Spray. See Page 1.

Pouring Concrete at the Rochester, N.Y., Sewage Works.



C. & E. M. Photo



The Bourne Bridge Over Cape Cod Canal, Opened on June 22, 1935 Which Received an A. I. S. C. Award As Most Beautiful Steel Bridge in Class A, Costing over $1,000,000. See Page 8.